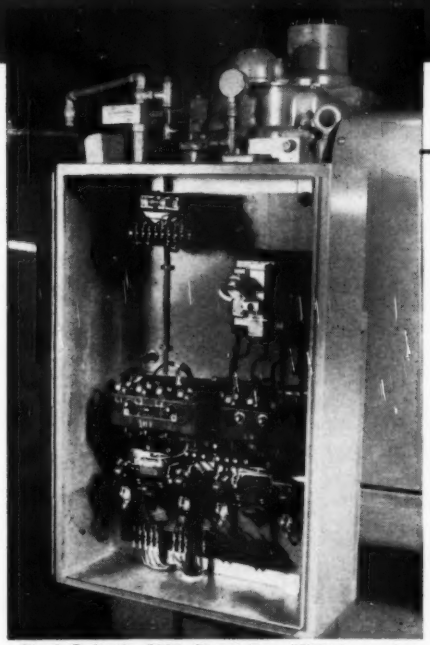

Clark Bulletin 6050, Size 2 Type "CY" Starter for Single Winding 2 Speed Constant Torque A.C. Motor used on Warner & Swasey Universal Turret Lathes.

CLARK CONTROLS help Warner & Swasey lathes

"machine better, faster, for less"

● Selected for long, trouble-free performance, Clark Bulletin 6050 Size 2, Type "CY" 2-speed starters are used on Warner & Swasey's No. 5 Universal Turret Lathes. Maintenance and wear on contact tips are reduced to a minimum as a result of an exclusive arc quenching method employed on Type "CY" starters. Effective arc interruption and reduced wear on tips is accomplished by using strong multi-turn magnetic blowouts and double-break contacts. Forced rotation continuously moves the arc from a hot to a cold spot, distributing the heat evenly over entire contact, preventing pitting or "build-up." Tips require no cleaning or dressing over long years of maintenance-free operation.

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

What is a Plant Engineer?

WHAT IS your answer? Each plant engineer must have a pet description of the many duties he is required to handle. Bob Hiller, plant engineer at the Dravo Corp., Pittsburgh, recently sent in his definition of a plant engineer. See if it fits yours:

He is

a specialist in non-specialization; a busybody of industrial accomplishment; a seeker of method, means and wherewithall; a solicitor of the specialized skills of others; a resourceful employer of nature's forces and materials; a judicious user of funds; a skillful analyzer and organizer; a practitioner of ingenuity and inventiveness; a good neighbor in the industrial and muncipal community.

He has

a capacity for broad responsibilities; an alert awareness of the new and improved; an inherent suspicion of the untried and unproven; an understanding of management and policies; an instinct for applied psychology; a sympathetic and constructive attitude toward human problems; a natural hospitality for the ideas of others; a talent for on-the-spot engineering judgement; a cool directness in an emergency.

He wants

to efficiently perform his assigned duties; to experience the satisfaction of work well done; to be economically sound in his department and his projects; to be cheerful and optimistic in the face of adversity; to be fair and impartial in business activities; to be loyal to his company and its interests; to be active in the affairs of his profession; to be recognized as an important member of management

and most of all,

to have, at least, a fair measure of the attributes listed above.

Oldsmobile's New Plant Engineer

William E. Rasmusson has been appointed plant engineer of the Oldsmobile Division of General Motors Corporation. He succeeds the late John B. Dakin, who was killed in an automobile accident. Rasmusson was superintendent of maintenance and construction in the plant engineering department before his present appointment.

He has been an Oldsmobile employee since 1942, joining the division as a mechanical engineer in the plant engineering department. He was promoted to group leader in 1947 and was placed in charge of engineering design in 1950. In 1951, he was made superintendent of maintenance and construction.

PE Editor Previews Pump

PARTICIPATING in a recent tour at the Milwaukee, Wis. plant of Ampco Metal, Inc., PLANT ENGINEERING editor Andy Anderson inspected the

Editors view turning and facing operation as performed on pump flange. Ampco Chief Engineer C. G. Linkfield (pointing) explains details as Plant Engineering editor Andy Anderson (third from left) observes results

firm's production facilities and previewed the first production models of Ampco's new corrosion-resistant pump line.

The new series is designed to operate at 1750 rpm, to complement the company's existing line of 3500 rpm pumps. With these two speed ranges covered, the company intends to provide a complete range of "off-the-shelf" pumps, with special-use features and alloy construction for corrosion resistance.

New Plants "Cut the Ribbon"

ESTABLISHMENT OF A new experimental shell-molding foundry, at Pittsfield, Mass., with complete facilities for making shell molds and pouring castings, was recently announced by **General Electric Company's** Chemical Materials Department . . . **Atlas Plywood Corp.** has just opened its new plant in Center, Texas, which will

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In a variety of corrosive services

BYERS WROUGHT IRON

serves longer at lower cost per year

The true cost picture isn't given by construction costs alone. It must include *maintenance* costs also . . . and when these are included, the most durable materials have proved themselves as the most economical.

You'll find Byers Wrought Iron Pipe and plate the best material to use when you are building for permanence. The illustrations show a few of the many applications where it is serving successfully for others . . . and where it can serve and save for you. The use of wrought iron *adds only a trifle to the overall cost* of a project, and this small investment is returned many times over in extra service.

Wrought iron lasts longer, at lower cost per year because of its unique structure which resists corrosion and fatigue. Tiny fibers of glass-like iron silicate, distributed through the body of high-purity iron, halt and detour corrosive attack, discourage pitting and rapid penetration. These fibers also anchor the initial protective scale, which shields the underlying metal.

Our booklet, *The ABC's of Wrought Iron,* tells the story of this protection, and how it is bringing piping economy to a variety of applications where corrosion is a threat. Write for your copy.

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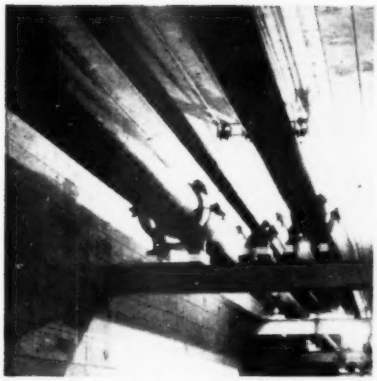
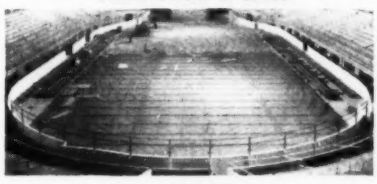


HEATING LINES

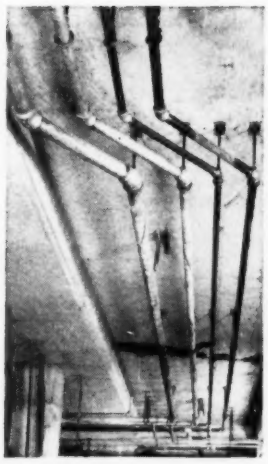
UNDERGROUND LINES



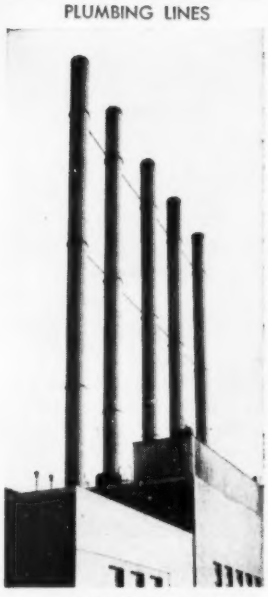
ICE RINKS

WATER WORKS, SEWAGE

SNOW MELTING, RADIANT HEATING



PLUMBING LINES



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AIR CONDITIONING SYSTEMS

BYERS

CORROSION COSTS YOU MORE THAN WROUGHT IRON

WROUGHT IRON

TUBULAR AND HOT ROLLED PRODUCTS

ELECTRIC FURNACE QUALITY STEEL PRODUCTS

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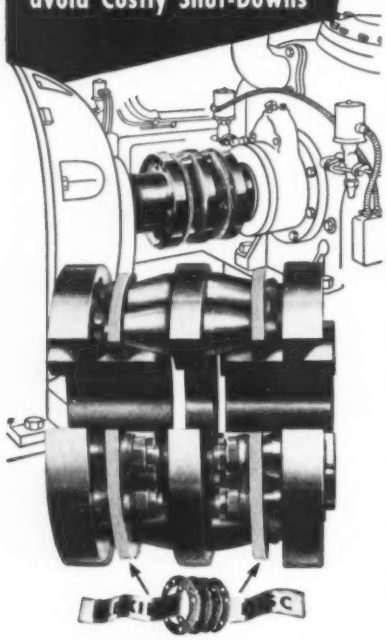
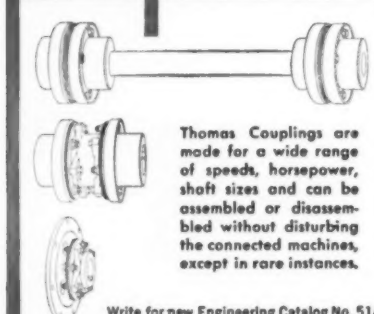
Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Write for new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.
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'ROUND ABOUT

increase its output of flush doors . . . **Cornell-Dubilier Electric Corp.**, is producing capacitors at its new plant in Sanford, North Carolina . . . **Westinghouse Electric Corp.** opened its plant in Montevallo, Alabama, which will manufacture welding electrodes and brazing rods . . . **United Concrete Pipe Corp.** has tripled the capacity of its centrifugal reinforced concrete pipe manufacturing facilities at Baldwin Park, California, with the completion of its expansion program.

Plant Engineer Mikus

Appointment of **Clifford A. Mikus** as plant engineer for Pittsburgh Plate Glass Company's new Greensburg, Pennsylvania, operations was recently announced.

Mr. Mikus is a native of Pittsburgh, Pa., and is a graduate of Carnegie Institute of Technology. During the past three years, he has served as chief design engineer for Oliver Iron and Steel Corp., Pittsburgh.

Interested in a Free Motor Maintenance Course?

HERE IS YOUR chance to sit back in your easy chair and pick up a few hints on the maintenance of motors and generators. A free two-year course is being offered on this subject by National Carbon Co. Known as the *National Brush Digest*, this series of pamphlets will be made available to electrical and maintenance supervisors and operating men.

Based on National Carbon's 70-year experience in brush theory and manufacture, these pamphlets, to be issued every second month for two years, are specially edited for the operating men. The installments will be short, easy to read and clearly illustrated. Saved for reference, the pamphlets will serve as a handy source of information on many practical maintenance problems concerning brushes and commutation.

Let us know if you would like to receive a copy or copies of these pamphlets, and we will see that your name is forwarded to National Carbon Co.

Refineries Come in All Colors

COLOR CONDITIONING has a new customer. According to an item appearing in the "Talk of the Town" section of *The New Yorker*, "the Bayonne refinery of the Esso Standard Oil Co., hitherto dressed in a drab wasteland of dark-red, black and aluminum-colored furnaces, storage tanks, and machine shops, was in the midst of being painted all colors of the rainbow and then some, led us to to make inquiries at Esso offices in Rockefeller Center . . .

"At the administration building we were met by David F. Edwards, assistant general superintendent of the plant, who gave us to understand at once that he considers the new decor an advance . . .

"Well, but why color, we asked—Esso getting aesthetic? 'No, just getting more efficient,' he replied. 'A couple of years ago, we began to experiment with color at our Baton Rouge plant. Efficiency went up an average of 15 per cent.'

". . . On the way to the waterfront, Mr. Edwards called our attention to a lavender furnace . . . 'See the black streak down the side of the tower? That's spillage, which results from faulty handling or faulty equipment. Our furnaces used to be painted black to conceal spillage. With light colors, the men are more careful, and if the equipment is at fault, we find it out fast. That streak there was caused by a leaky valve. In the old days, it might have leaked for weeks."

1954 Construction Second Best

IT IS INTERESTING to note in a recent issue of *Business Bulletin*, published by The Cleveland Trust Co., that if American business enterprise does what it plans to do, it will spend the second largest sum on record for new plant and equipment in 1954, displacing 1952 as the previous second-best year. Latest joint estimates of the Department of Commerce and the Securities and Exchange Commission, released in June, put the total for the first nine months of 1954 at a higher figure than for any corresponding period except in 1953.

Standardization of Pallets

PALLET USERS will be interested in the revisions to the National Wooden Pallet Manufacturers Association standards which were issued in 1949.

The new Standards establish two industry grades of pallets, set up a numerical system for pallet type designation and place new limitations on fastenings, lumber requirements and manufacturing practices.

Copies of the revised specifications are available to all users upon request to the National Wooden Pallet Manufacturers Ass'n, Barr Bldg., Washington 6, D. C.

X-Ray Diffraction School

FALL SESSION of the Norelco X-ray Diffraction School is scheduled this year at the Knickerbocker Hotel, Chicago, during the week of October 25 to 29.

Morning sessions of the school will be devoted to lectures and afternoon meetings will involve laboratory demonstrations using the latest type of equipment. On Friday, October 29, the school will devote the day to actual application problems from the field and prominent speakers will discuss details of methods in current use around industrial laboratories and plants.

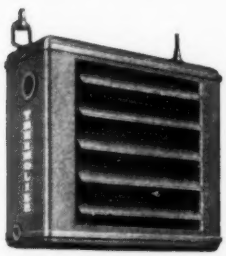
No registration fee will be charged and those who wish to attend should write to Vern W. Palen, Research and Control Instruments Division, North American Philips Co., Inc., 750 South Fulton Avenue, Mount Vernon, N. Y.

HEAT

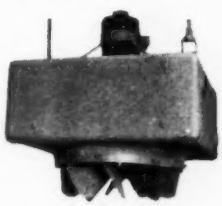
where you want it
when you want it
whatever the fuel you use

GRINNELL UNIT HEATERS

Horizontal Gas-Fired Model for natural, manufactured, mixed and LP Gases.



Horizontal Model for steam and hot water systems.



Vertical Model for steam and hot water systems.

Grinnell quality is well known. The "Grinnell" name is backed by over 60 years of heating experience. Regardless of the type and model you choose, you can depend on a Grinnell Unit Heater to give balanced heating performance plus maximum fuel economy. Call on Grinnell . . . for the unit heater to meet your specific needs.

GRINNELL
Gas-Fired Unit Heater

Available in 7 sizes — ranging from 25,000 to 200,000 Btu per hour input

Grinnell Gas-Fired Unit Heaters are easy to install, simple to operate and maintain. Efficient performance is assured — with any type of gas — by modern design of burners and heat exchanger, proper motor and fan unit. Automatic safety pilot operates to shut off main gas supply if pilot goes out. Flashback and extinction noise prevented by the burners' raised port design and proper port size for the gas used. American Gas Association approved.

GRINNELL THERMOLIER
Steam/Hot Water Unit Heater

4 models . . . 18 sizes — from 35,600 to 275,300 total heat delivered, Btu per hour

Three basic models—horizontal, vertical and a special horizontal Textile model. (Adjustable velocity nozzle also available for use on horizontal models.) All models have plain thermostatic trap, the simplest and least expensive kind of a trap, made practical because of unit's exclusive internal cooling leg; maximum capacity provided and destructive water hammer eliminated by built-in pitch of tubes. Many other important features.

GRINNELL
WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

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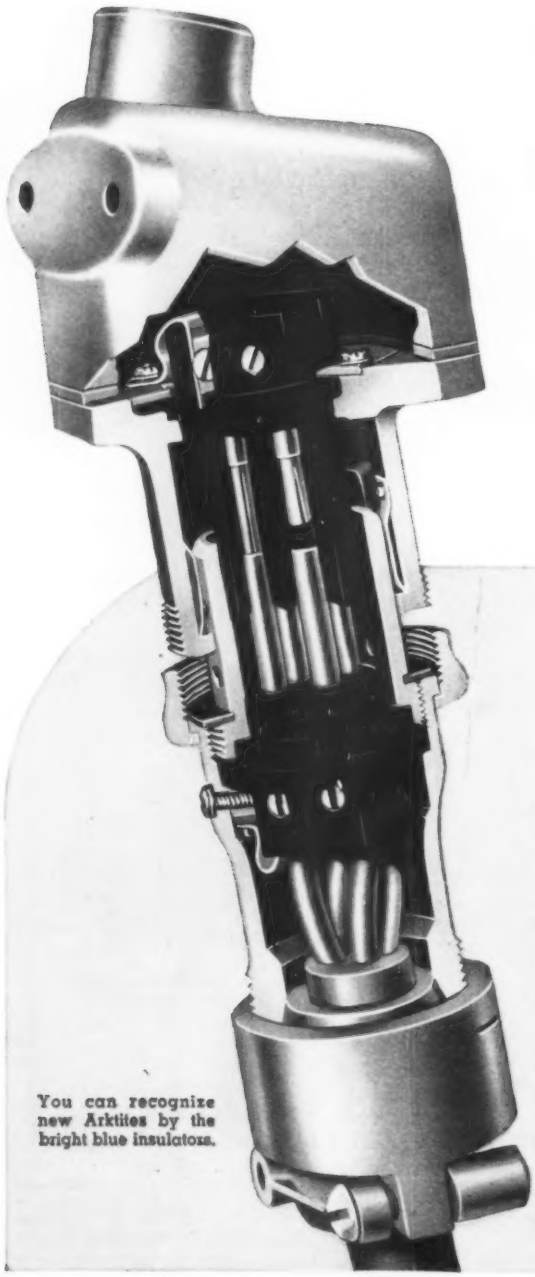
Announcing...

New, Re-Designed Arktite HEAVY DUTY PLUGS & RECEPTACLES



You can recognize new Arktites by the bright blue insulators.

New pressure connectors; no soldering unless you prefer to do it.

New easier-to-wire interior assembly; comes out in one piece—just remove 2 screws.

New easier-to-reverse plugs and receptacles; no machining; no special tools.

New plug adaptability; takes any size portable cable up to full 30 amp. capacity.

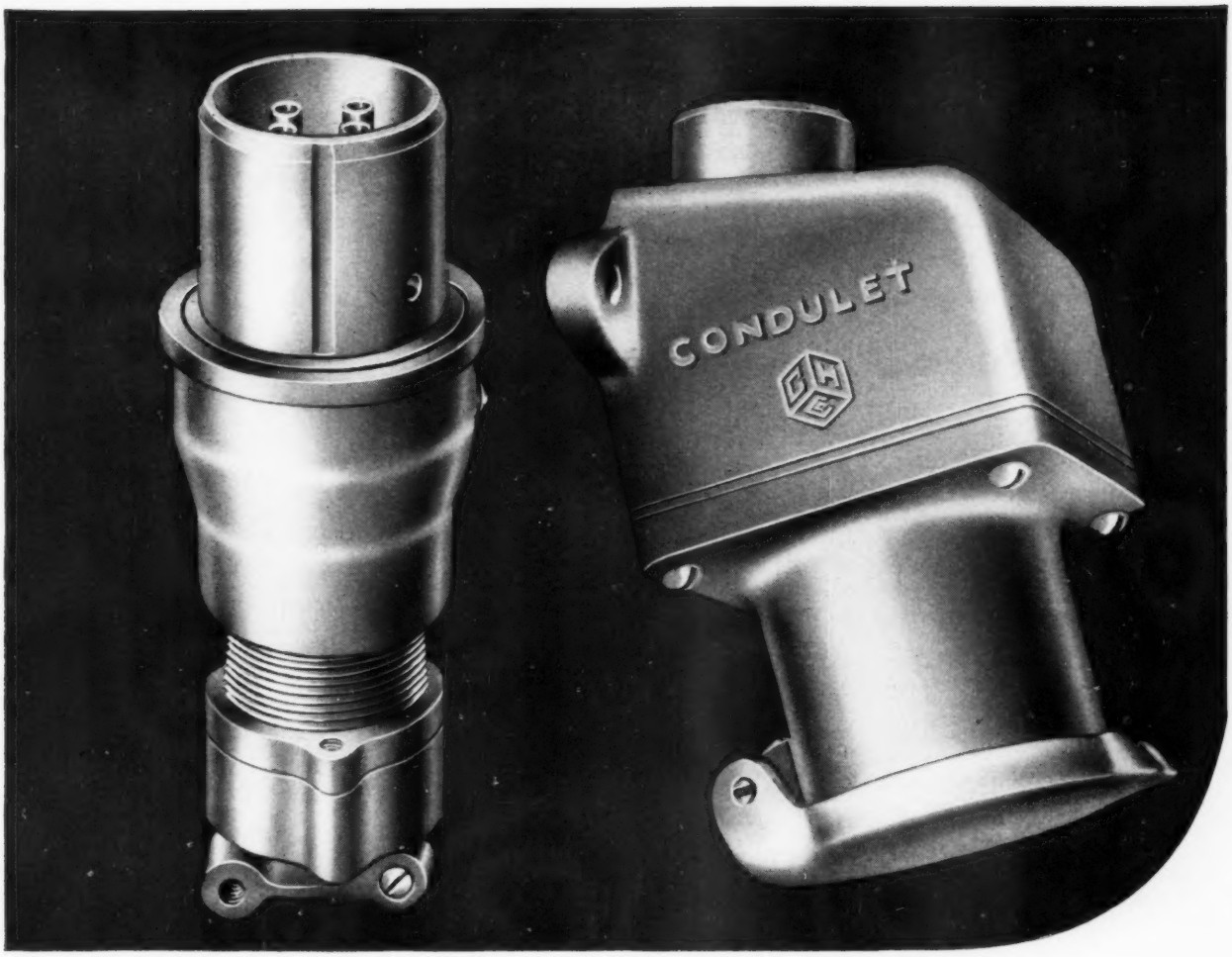
Circuit-Breaking Features make Arktite safe at full load without disconnect switches

Arktite's principle of insulating each contact in a separate chamber has been recognized for 20 years as the *safe* way to snuff the arc in making or breaking a circuit. Momentary arcs are formed or broken while the plug contact is still inside the arcing chamber. Flashover to the other side of the circuit or to the housing cannot occur even if the break is made at full load.

Grounding contact made first; broken last: *Arktite's* grounding contacts are longer than the load contacts. Plug and tool are grounded *before* the circuit is made and *after* it is broken.

Arc snuffed by pressure and lack of oxygen: Each plug fits so closely in the opening of its individual arcing chamber that arcs are snuffed by pressure-deionization and lack of oxygen.

Cable Entrance Watertight: A clamping nut seals a rubber bushing tightly around the cable. No moisture can enter.



First Complete Re-Design in 20 Years...

yet fully interchangeable with older types

Arktite's basic design is so safe and practical that no change in the fundamentals has been found necessary in 20 years. New wiring ease . . . new flexibility in making either the plug or receptacle the power side . . . and new adaptability to varying portable cable sizes up to 30 amps. have dictated today's re-design.

Even so, the improved *Arktite* plugs and receptacles are fully interchangeable with older types, and *list at the same economical price.*

Currently available in only the 30 amp. size (to be followed soon by new 60 and 100 amp. sizes), today's improved *Arktites* are made with two distinct ground circuits. Style 2 (illustrated) has an extra grounding contact bonded to the housing and forming a parallel circuit with the plug sleeve and receptacle detent spring. This assures continuity of the grounding circuit under severe service. Style 1 relies upon contact of the plug sleeve with the detent to complete the safety circuit. The extra grounding conductor in the portable cable is bonded to the plug handle.

Two-pole, three-pole and four-pole styles.

Full details described in technical bulletin sent free on request. Or see your Crouse-Hinds distributors.

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SYRACUSE 1, N.Y.

CONDULETS • FLOODLIGHTS • TRAFFIC SIGNALS • AIRPORT LIGHTING

For more facts circle 506 on Reply Card

for Rust-Free Hot Water

look for the Copper Lining—

they did at the

New 525 Wm. Penn Place Building

Take a tip from men who specify hot water storage heaters for America's important buildings: "look for the p-k copper lining."

High above Pittsburgh's famed Golden Triangle, towers a glistening new skyscraper. This magnificent 41 story structure houses the main offices of the United States Steel Corporation and the Mellon Banking interests. From tower to basement, 10 p-k copper-lined storage heaters provide an abundant supply of rust-free hot water.

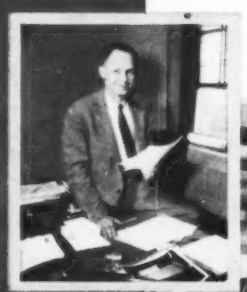
These heaters have been in operation since the building opened in 1952. Because of the corrosiveness of water in the area, the performance record of the heaters is already noteworthy.

Paul L. Flemm, Building Engineer, is enthusiastic about p-k heater operation. "Heating water costs money. Trouble-free operation keeps costs down. We haven't had a single case of trouble with the p-k heaters . . . to date no cause to expect any. We . . . expect much better service than we would get from heaters made of ferrous metals."

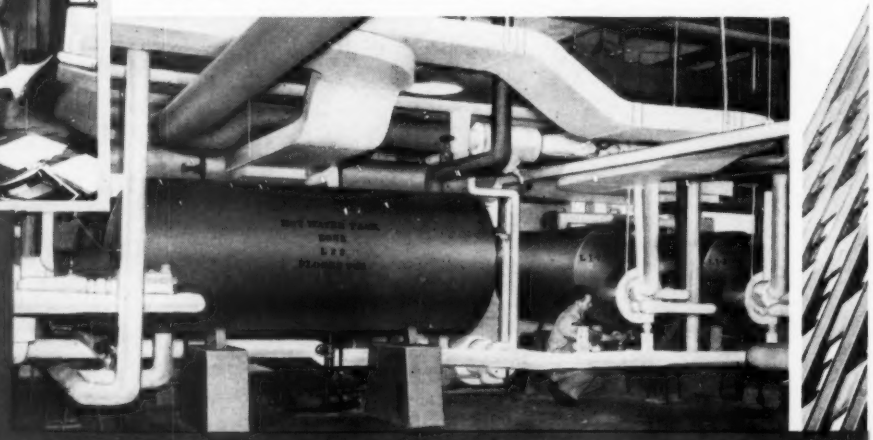
For an unfailing source of pure, rust-free hot water—

LOOK FOR THE p-k Copper Lining.

Complete catalog gives all the facts. It's yours for the asking.



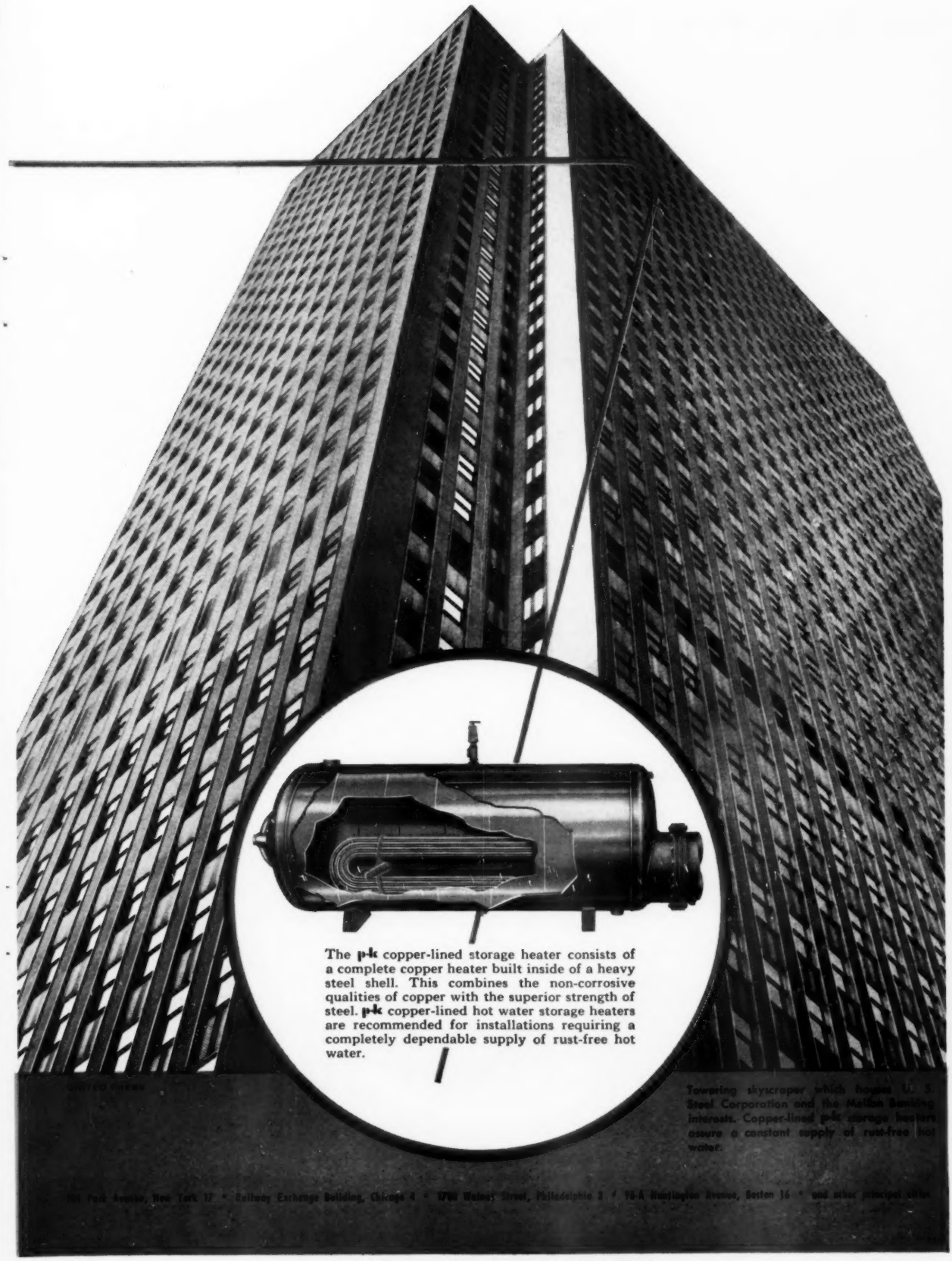
Paul L. Flemm, Building Engineer of the 525 Wm. Penn Place Building, is well satisfied with the operational record of his p-k copper-lined hot water heaters.



All of the heaters used in the 525 Wm. Penn Place Building are of the recirculating type with the water going in at 105 deg. F. and out at 140 deg. F. Each has two heating elements; one coil is a condensate cooler which preheats the water with hot condensate; the other uses live steam, as required, to give the desired outlet temperature.

the Patterson-Kelley Co., Inc.

1400 Burson Street, East Stroudsburg, Penn.



The p-k copper-lined storage heater consists of a complete copper heater built inside of a heavy steel shell. This combines the non-corrosive qualities of copper with the superior strength of steel. p-k copper-lined hot water storage heaters are recommended for installations requiring a completely dependable supply of rust-free hot water.

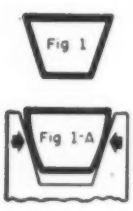
Towering skyscraper which houses U. S. Steel Corporation and the Mellon Banking interests. Copper-lined p-k storage heaters assure a constant supply of rust-free hot water.

[illegible] Park Avenue, New York 17 • Railway Exchange Building, Chicago 4 • 1700 Walnut Street, Philadelphia 3 • 75-A Hemingway Avenue, Boston 16 • and other principal cities

For more facts circle 507 on Reply Card

to cut your V-Belt costs--

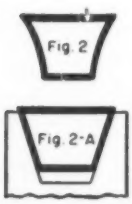
--just make this simple test!



Bend *any* V-Belt that has *straight sides* (Fig. 1). As the belt bends, *feel* the sides ***bulge out*** (Fig. 1-A). Clearly, the bulging sides are forced to press *unevenly* against the V-pulley—and this *concentrates* the wear at the points shown by arrows (Fig. 1-A). Naturally, this means shorter life for the straight-sided V-Belt.

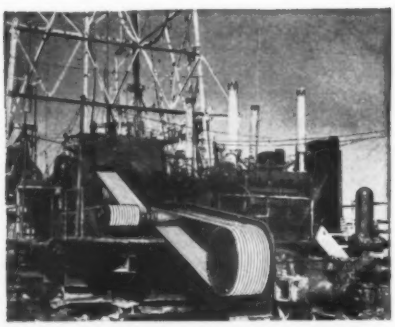
Now bend the Belt with CONCAVE SIDES...

. . . the Gates VULCO ROPE (U.S. PAT. 1813698) (Fig. 2)



You find that the CONCAVE SIDES *fill out* and become perfectly straight. They thus press *evenly* against the V-pulley (Fig. 2-A). All wear is distributed *uniformly* across the *full width* of the GATES VULCO ROPE— and this means *longer* belt life and *lower* belt costs for you!

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES... the GATES VULCO ROPE!



Typical Gates Vulco Rope Drive—Gates V-Belts are built with Concave Sides to insure longer belt wear.

VULCO ROPE DRIVES

Gates

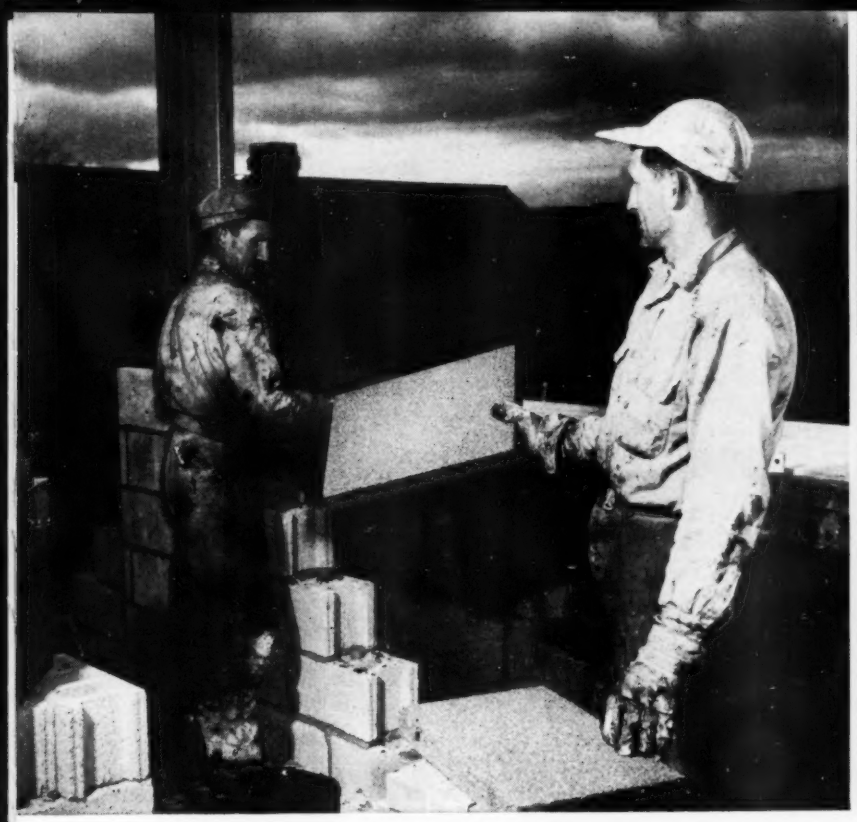
REG U S PAT OFF

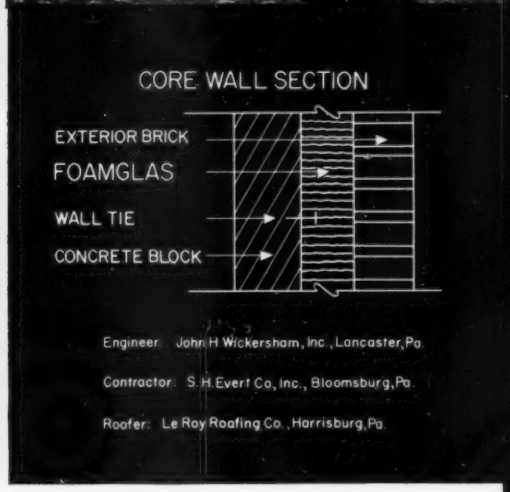
THE GATES RUBBER COMPANY
DENVER, U.S.A.

• Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries through-out the world.

CB-549

For more facts circle 508 on Reply Card





Engineer: John H. Wickersham, Inc., Lancaster, Pa.

Contractor: S. H. Evert Co., Inc., Bloomsburg, Pa.

Roofer: Le Roy Roofing Co., Harrisburg, Pa.

Chief Engineer Harold Cahn, General Cigar Co., Inc., Lancaster, Pa., reports . . .

"Our FOAMGLAS insulation has stayed dry in 65% to 85% humidity giving us lasting insulating performance"

Precise control of plant humidity and temperature is extremely important in manufacturing of quality cigars. That's why General Cigar Company put *stay-dry* FOAMGLAS insulation in walls and on the roof of their new Mt. Carmel (Pa.) plant addition to help maintain a constant 65% to 85% humidity and 75° F. temperature.

General Cigar's Chief Engineer, Harold Cahn, explains why they use cellular glass insulation to help maintain the quality of their White Owl, Robt. Burns, Van Dyck and Wm. Penn cigars: "The high humidity which is vital in tobacco processing is mighty rough on ordinary insulations. Until 1948 the roof of our Lancaster plant was insulated with an organic insulation which became water-soaked and ineffective. We removed the old insulation and replaced it with FOAMGLAS because it has a moisture-proof cellular glass structure.

"For six years it has proved it will stay dry even when subjected to this very severe test . . . constant exposure to a very humid atmosphere. Naturally we used FOAMGLAS to insulate the roof and walls when we built our new Mt. Carmel plant addition last Fall."

The waterproof, sealed glass cell structure of FOAMGLAS is mighty important to you, too. It's a big reason why this unique insulation gives such dependably efficient, long-lasting performance insulating roofs, walls, floors, cold rooms, piping and equipment. In addition, FOAMGLAS is light yet strong and rigid . . . fireproof, vermin-proof and acid-proof.

For more facts, please write for our brand new booklet PE-104.

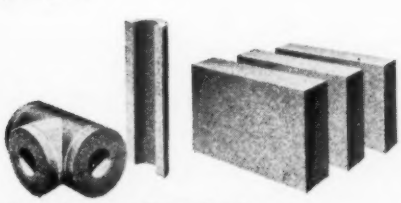
Harold Cahn

PITTSBURGH CORNING CORPORATION

One Gateway Center • Pittsburgh 22, Pa.

FOAMGLAS®

the cellular, stay-dry insulation



Pittsburgh Corning also makes PC Glass Blocks

For more facts circle 509 on Reply Card

IT WORKS WONDERS IN MATERIALS HANDLING-

300 to 400% increase in efficiency

75% decrease in handling costs

One Truck-Mounted
Dempster-Dumpster Handles Scores
of Containers... All Designs... All Sizes

With the Dempster-Dumpster System, one truck-mounted Dempster-Dumpster accomplishes more than several conventional dump trucks. You eliminate trucks standing idle. You eliminate re-handling of materials. You eliminate loading crews. You increase efficiency, sanitation and good plantkeeping with this Dempster-Dumpster System—the lowest cost method of bulk materials handling ever devised.

It's like having one truck with scores of bodies. One truck-mounted Dempster-Dumpster serves scores of detachable containers. These containers range from 2 to 21 cu. yds. capacity for use with recommended type Dempster-Dumpsters. Each container is designed to suit the materials to be handled—be they solids, liquids, dust, bulky, light or heavy. You simply place these containers at convenient materials accumulation points outside or inside buildings. As each is loaded, it is picked up, hauled and dumped (or load set down intact). Entire operation is handled by hydraulic controls in cab by only one man, the driver.

The list of manufacturers using the Dempster-Dumpster equipment reads like the "Who's Who Among the Nation's Leading Manufacturers". We mention this simply to point out that dozens of the nation's oldest and most successful firms use the Dempster-Dumpster System because of its efficiency and tremendous savings. Write to us now for complete information. Manufactured exclusively by Dempster Brothers, Inc.

Representatives in principal cities throughout the United States, Canada and foreign countries. There's one near by to serve you promptly.

DEMPSTER BROTHERS, 1104 Shea Bldg., KNOXVILLE 17, TENNESSEE

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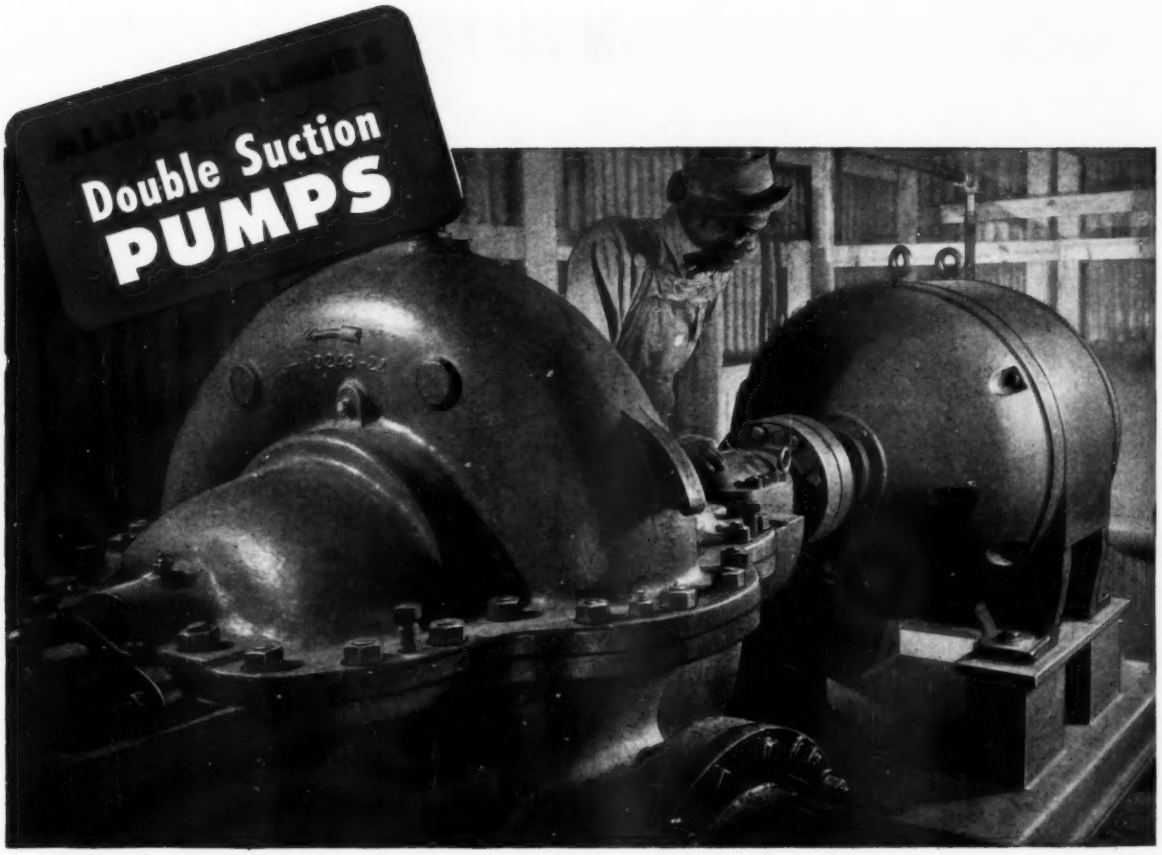

CUT PUMPING COSTS

Get an Allis-Chalmers pump with:

- **HEAVY DUTY CONSTRUCTION** — Extra metal thicknesses, extra strong parts, no skimping.
- **WIDE MATERIAL CHOICE** — Iron, bronze, stainless steels and combinations to handle practically any liquid.
- **MANY OPTIONAL FEATURES** — Choice of sealing methods and bearing arrangements for special requirements.
- **UNIT RESPONSIBILITY** — Pump, motor and control — a complete unit — supplied and guaranteed by Allis-Chalmers.

FOR ALL GENERAL USES AND MANY SPECAL PROCESS APPLICATIONS, Allis-Chalmers double suction pumps are built with that extra measure of strength and ruggedness that assures you long life and low maintenance.

Every Allis-Chalmers double suction pump is carefully tested on the most modern electronically controlled pump testing equipment in the industry. Each installation is individually engineered by men whose experience in thousands of pump installations will give exactly the right pump for your needs.

Whatever your pumping problem, call your nearby Allis-Chalmers Authorized Dealer or District Office. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 08B6146.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

A-4287

ALLIS-CHALMERS

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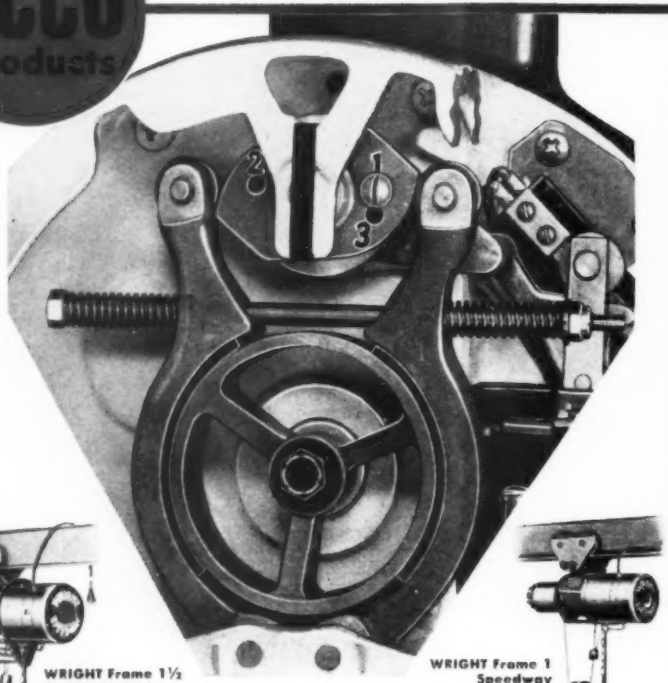
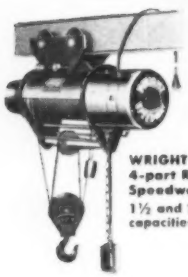
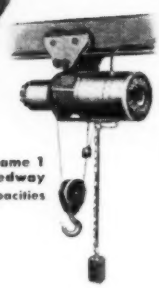
Why WRIGHT Hoists

ACCO products





WRIGHT Frame 1½ 4-part Reeved Speedway 1½ and 2-ton capacities



WRIGHT Frame 1 Speedway ¼ to 1-ton capacities

1954 MODELS

Nothing to adjust but the cam!

• The brake assembly pictured above for the WRIGHT FRAME 1 SPEEDWAY HOIST is your assurance of maximum hoist service... minimum down time. Adjustment of this cam-actuated brake to compensate for brake lining wear is literally "as simple as ABC." *There is no guess work about it.*

When the load hook starts to drift, remove the screw shown at position No. 1 (*see picture*), swing the cam around so that position No. 2 is in line, and replace the screw that secures the cam to the solenoid lever arm. For the final one-third of brake lining wear, set the cam at position No. 3. This repositioning of the cam is the ONLY adjustment to be made by the users of WRIGHT Hoists. The brake springs and solenoid are factory-set... NEVER need adjustment for brake lining wear.

Long life is a built-in characteristic of these hoists. They are built and guaranteed for service to the limit of the duty cycle of 1½ H.P., 30 minute, totally enclosed NEMA specification motors. These 1954 models provide full accessibility of parts for lowest maintenance costs. To get at the brake and controller, you remove two screws which hold the end cover. To get at the limit switch, transformer, and solenoid coil, you remove three screws and the side cover comes off. With this full accessibility you can make a brake adjustment or replace electrical parts in a matter of minutes.

Remember, PRICE + MAINTENANCE = COST. For full details on the low-cost WRIGHT Frame 1 Hoists see your WRIGHT distributor or write our York, Pa., office for literature.

ACCO

TRADE MARK

Wright Hoist Division

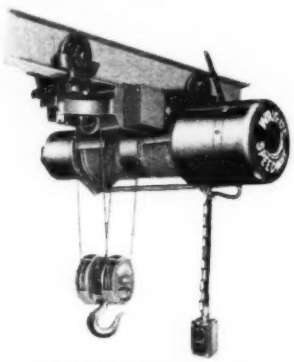
AMERICAN CHAIN & CABLE

York, Pa., Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

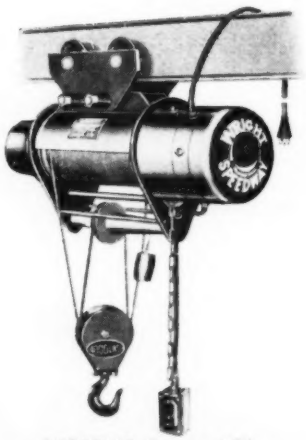
Hoists Trolleys Cranes

IMPORTANT Maintenance Features

- **LONG LIFE**
- **SERVICE ACCESSIBILITY** End and side covers quickly removed for complete accessibility of brake, controller, solenoid, limit switch, transformer
- **SOLENOID ASSEMBLY** never needs adjustment, designed to compensate automatically for brake wear
- **BRAKES** require only two pre-determined field settings...no guess work
- **FRAMES** Strong, ductile
- **GEARS** Alloy steel
- **MOTORS** NEMA specifications



WRIGHT Frame H-1 Close Headroom Speedway
¼ to 1-ton capacities

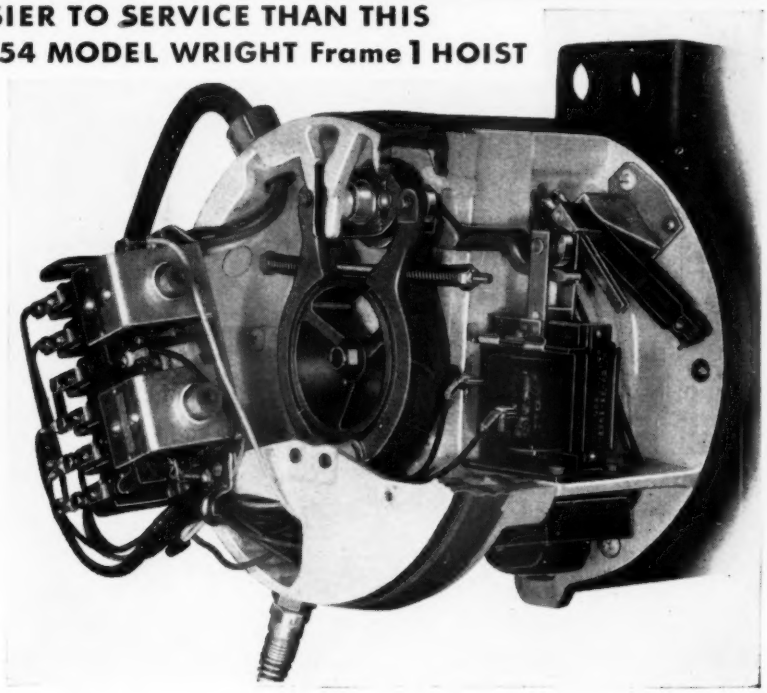


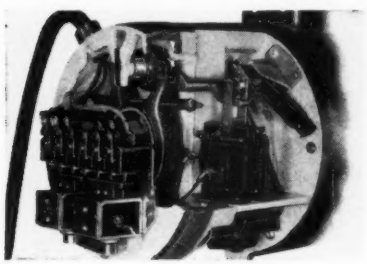
WRIGHT Frame 1½ 4-part Reeved Speedway
1½ and 2-ton capacities

Smash Maintenance Costs!

NOTHING COULD BE EASIER TO SERVICE THAN THIS 1954 MODEL WRIGHT Frame 1 HOIST

This partly cut-away illustration (with controller swung out of position) shows the full accessibility of parts provided in the 1954 models of WRIGHT *Frame 1 Speedway Hoists. Note the simple, rugged design of brake and solenoid assembly.*





Controller back in operating position. Note that brake cam can be reset without moving controller.

What Plant Men Are Saying about Frame 1 Wright Hoists...

Chief Electrician says: "Now we have a hoist that is simple to service."

Maintenance Superintendent says: "We are going to buy one of those hoists, put it on our toughest job and equip the brake with a counter. I'll bet that brake will operate a million times without an adjustment. This is what we've been waiting for, it's a cinch to get at, and we can adjust the brake, and do it right, in a matter of minutes."

Plant Engineer says: "If all small hoists were new WRIGHT SPEEDWAYS, we could sure cut our maintenance costs."

Electrician says: "I like the way the electrical controls are grouped, and they're easy to get at."

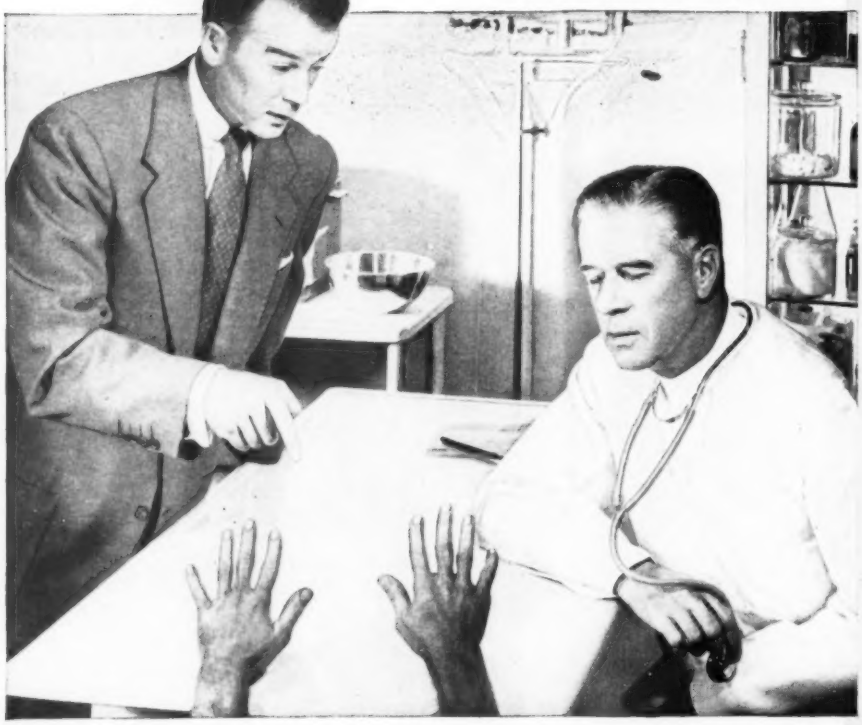
Write for this new booklet...

This new booklet **(#DH133B)** *gives complete information on the 1954 Model* WRIGHT SPEEDWAY ELECTRIC HOISTS, *Frame 1 and 1½ (500 to 4000 lb. capacities). The booklet fully describes and illustrates the new designs and features that minimize maintenance costs, and make* WRIGHT *Speedway Frame 1 and Frame 1½ Electric Hoists the easiest of all hoists to adjust and service. Write our York, Pa., office for a copy of this Booklet #***DH133B.**

REMEMBER: Purchase Price + Maintenance = TOTAL COST

For more facts circle 512 on Reply Card

VISIT US AT BOOTH 88, 89
OCTOBER 18-22, IN CHICAGO
AT THE NATIONAL SAFETY CONGRESS



LET'S START WITH THE CAUSES OF *DERMATITIS*

Costly dermatitis can be prevented. By getting at the basic causes. We can help you by analyzing the work your employees do, checking for hazards our experience tells us might cause dermatitis. We'll check the care given their hands. Then we'll compare your present protective treatments with the skin care methods we've found to be best during our many years of controlling industrial dermatitis.

Where it is necessary, we offer consultation with specialists. Complete chemical and bacteriological analysis.

After these preliminaries we can help you set up a *continuing program* for dermatitis control. Provide leaflets and posters to help educate employees. Assist you in choosing the particular products from West's broad line that will best apply to your situation. At the right are a few examples.

Let's see how WEST products control dermatitis

West's complete line of sanitation products includes hand cleaners, protective creams, antiseptic soaps and protective garments. Everything you need for effective control of dermatitis. Here are a few of them.

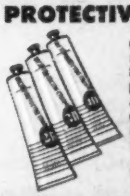
LAN-O-KLEEN

is a heavy duty powdered hand cleaner. Contains a relatively high percentage of "free" lanolin, the emollient lecithin, soap, and balanced alkalis blended together by a secret process in a fine corn meal base. Provides both super-fatting and effective cleaning.

ANTISEPTIC SULPHO HAND CLEANER

contains bacteriostatic properties. Will not defat the skin. Excellent skin cleaner even for sensitive hands. Offers protection against many harsh chemicals and other materials used by people in industry and institutions.

ANTISEPTIC PROTECTIVE CREAMS



contain bacteriostatic properties. Formulated to provide protection against almost every occupational hazard. Used by thousands of workers throughout the United States and in Canada.

WANT DETAILS?

Tear out this coupon and mail with your letterhead

Dept. 52

I'm interested in:

☐ A FREE booklet packed with information on dermatitis and helpful tips on skin care.

☐ A talk with a West specialist about my dermatitis problem. No sales pitch. No obligation. Just discussion, a look at samples, and a demonstration if I want it.

WEST DISINFECTING Company

West's broad line of products includes not only cleaners, soaps, and protective creams but also washroom service . . . disinfectants . . . deodorants . . . insecticides . . . floor maintenance materials. West is also the exclusive distributor of Kotex Sanitary Napkins sold through vending machines.

42-16 West Street, Long Island City 1, N. Y.

For more facts circle 513 on Reply Card

HERE'S YOUR LATEST COPY OF CATALOG 754 ... Just off the press!

Contains the most up-to-date and complete information on Stock Roller Chains and Sprockets

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WRITE TODAY— OR JUST FILL OUT AND MAIL THE COUPON

From the files of DIAMOND CHAIN ENGINEERS

Backed by 65 Years of Roller Chain Experience

In this latest 64-page Catalog 754, you will find the most authentic and complete data on Roller Chains and Sprockets—data drawn from 65 years of experience in the manufacture and application of Roller Chains. There is no substitute for such experience.

You will find it worth while to have a copy of Catalog 754 on your desk for ready reference. Write today—or just fill out and mail the coupon.

DIAMOND CHAIN COMPANY, Inc.
Dept. 614, 402 Kentucky Avenue, Indianapolis 7, Indiana
Offices and Distributors in All Principal Cities
Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND ROLLER CHAINS

CLIP COUPON AND MAIL TODAY!

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Dept. 614, 402 Kentucky Ave.
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Please mail a copy of your New Catalog 754 on Stock Chains and Sprockets to:

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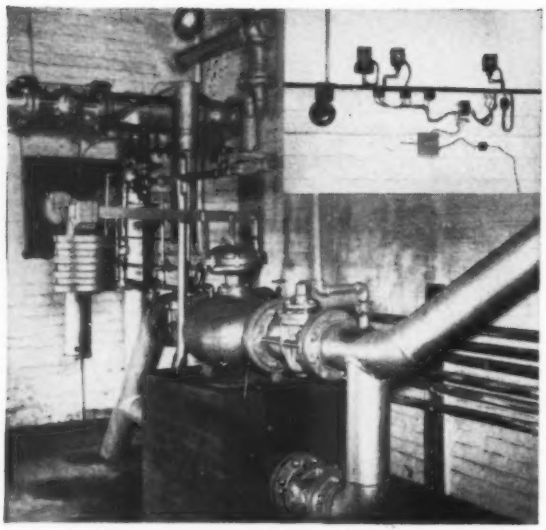
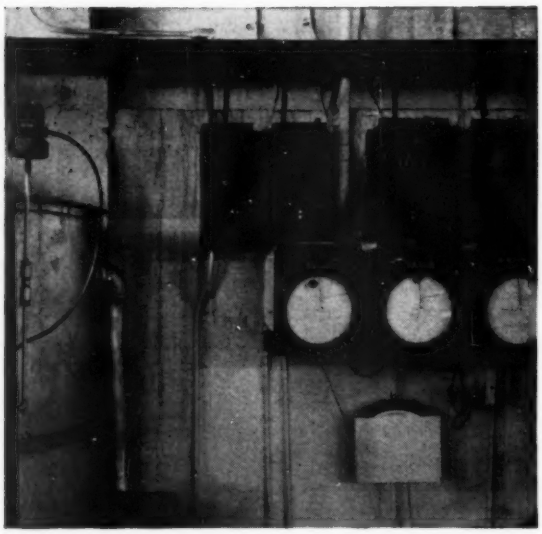


UNATTENDED GAS PLANT IS PROTECTED AGAINST PRESSURE FAILURES *at this central distribution point of the New York State Electric and Gas Co., Auburn, N. Y. Three Honeywell Pressuretrol units and one Honeywell Vaporstat unit sound alarm at a manned sub-station at first threat of pressure failures.* **Control equipment cost—$59.35***



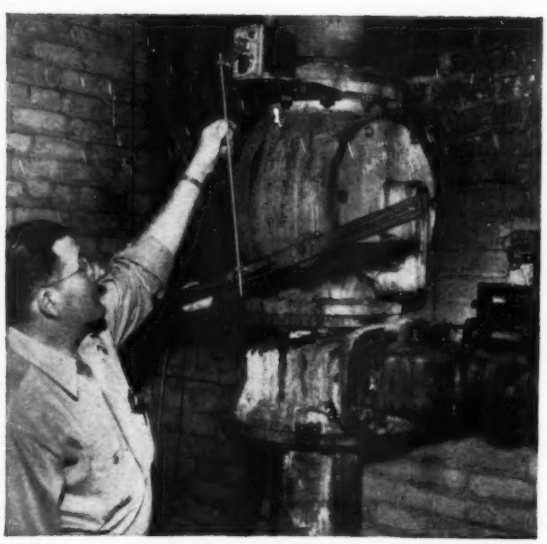
SAFE OPERATION OF CAUSTIC CHARGING TANKS IS ASSURED *at the Sayles-Biltmore Bleacheries of Asheville, N.C. Whenever caustic level in tank rises to overflow danger point, a Honeywell Vaporstat unit warns operator by energizing an alarm system.*

Control equipment cost—$37.25*

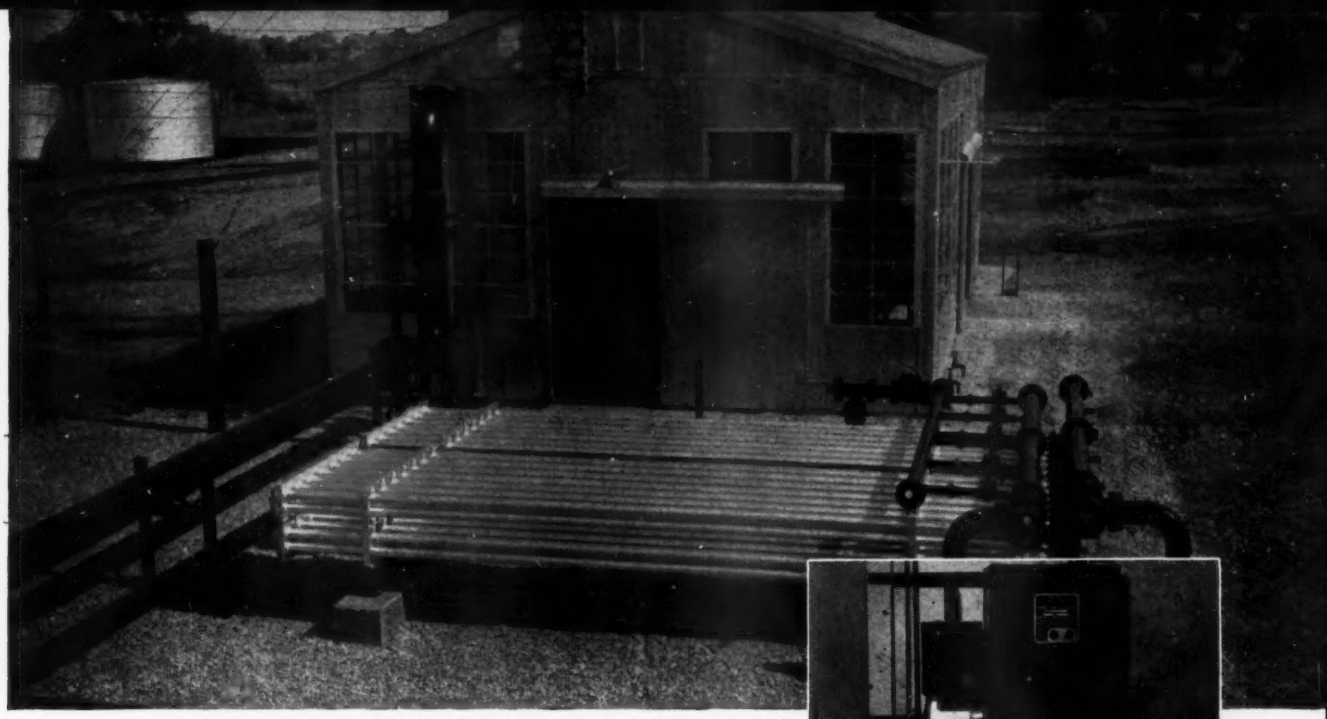
Honeywell Industrial

SENSITIVE ALARM WARNS OF SOLENOID VALVE FAILURE *in a water-cooled vacuum pump at the Spaulding-Moss Co., Boston, Mass. Before rising water temperature can cause serious pump damage, a Honeywell temperature controller automatically shuts off pump and signals operator.*

Control equipment cost—$21.30*



PERILOUS CLIMBS TO ROOF ARE NOW AVOIDED *at the Curtis Hotel in Minneapolis, Minn. thanks to the installation of Honeywell Modutrol and Pressuretrol units. Rooftop adjustments of a butterfly valve for desired pressure changes in an exhaust steam heating system can now be made by operator in boiler room.* **Control equipment cost—$75.75***



RISK OF FIRES FROM FLAME OR POWER FAILURE IS ELIMINATED *at this steam plant for a Shell Oil Co. installation in Southern Illinois. After a fire which destroyed the original plant, Honeywell Protectoglo combustion safeguard equipment was installed which now provides complete safety control in many phases of the steam plant operation.*

Control equipment cost—$138.04*

Controls *Increase safety*

THE safety factor is vitally important in almost any phase of production activity. Often overlooked is the fact that many solutions to weighty safety problems lie in the low-cost applications of simplified controls.

For example, in steam plant installations, the threat of fires from power failures and gas pressure fluctuations is counteracted by Honeywell Industrial Controls . . . such as the Protectoglo combustion safeguard equipment. In addition, Honeywell alarm systems and limit switches provide for immediate adjustment whenever dangerous situations threaten.

At your plant, too, versatile Honeywell Controls might well be applied to the reduction of dangers and risks and the assurance of safe working conditions for plant personnel.

Low-cost Honeywell Controls are uncomplicated in installation and in construction . . . designed to do a job effectively, inexpensively.

Throughout your plant you may find numerous opportunities for Honeywell Controls to eliminate the risk element . . . as well as increase production, reduce costs, improve quality.

Your nearby Honeywell sales engineer will be glad to discuss how you can *increase safety* through the use of these controls. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa. *Also manufacturers of a complete line of precision measuring, recording and controlling instruments.*

******Approximate cost—Prices subject to change without notice.*

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

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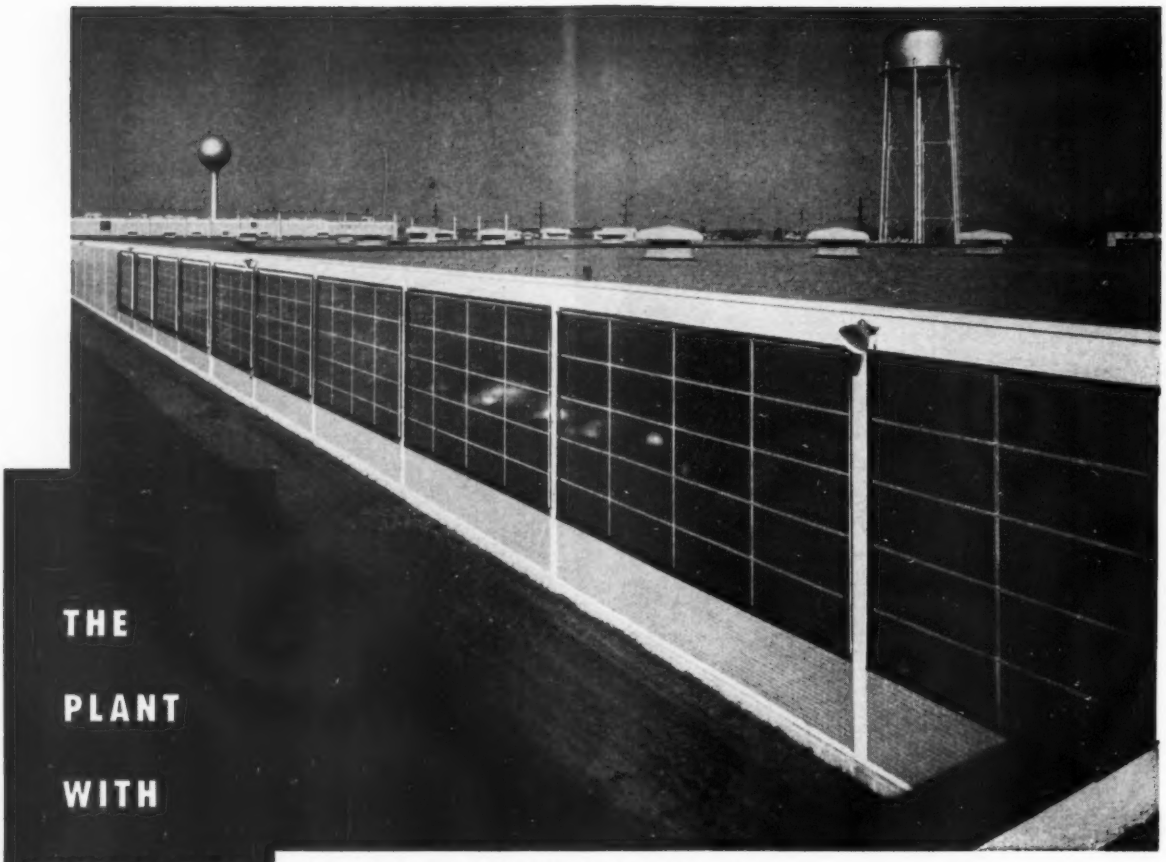

THE PLANT WITH INSIDE-OUT WINDOWS

Luxlite Coolite (glare reduced) installed in sidewall sash of Sawyer Biscuit Company, Melrose Park, Illinois. Skidmore, Owings, Merrill, Architects George A. Fuller Co., Gen. Cont., Hamilton Glass Co., Glazing Cont.

Plant Exterior of Unusual Beauty and Utility Achieved By Novel Installation of Coolite Glass

By installing the pattern side on the *inside*, the windows reveal an exterior color of deep blue porcelain... an effect so attractive that the architects involved are continuing to use the technique in other construction. From the inside, Coolite Glass combines all of its recognized light distributing qualities ... floods work areas with glare free softened natural illumination ... plus affording Coolite's acknowledged heat absorbing qualities.

Coolite filters out unwanted factors in "raw" sunlight, helps keep plant interiors cooler, more comfortable. Workers see better, feel better, work better in natural daylighting that has been Coolite-conditioned.

Write today for free catalog. Samples on request.

CONSIDER COOLITE FOR YOUR CONSTRUCTION

If you are planning new construction or modernization, let Coolite fight employee eye fatigue, reduce rejects, boost morale. Get the facts about this amazing glass that pays for itself in increased efficiency and economy. See your nearby Mississippi Glass distributor today.

MISSISSIPPI *Glass* COMPANY

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NEW YORK • CHICAGO • FULLERTON, CALIF.

see our catalog in S or write for copy

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

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BULLETINS just released and of immediate plant interest

ELECTRICAL

101 Electric Motor Test Data—The selection of electric motors on the basis of certified performance tests is the subject of this paper. Information is presented in tubular form for engineering performance, comparison as to what the results indicate in relation to use. Electro Dynamic Div., General Dynamics Corp.

102 Electric Motor Control—Containing engineering and design data including wiring diagrams, Catalog 101, a 140-pp book on electric motor control is divided by major product classifications, and lists more than 2700 items including magnetic starters, combination starters, control panels, etc. Book contains photos, descriptions and prices. Available to qualified plant engineers, please state your job title when requesting this book. Furnas Electric Co.

103 Power Apparatus for Chemical Industry—No. 41. A recent 28-pp issue of the E-M Synchronizer, deals with the application of electric power apparatus in the chemical industry. An article on large motors and controls emphasizes enclosures and special features recommended for protection against hazardous conditions. Also in this publication is a selection index for large motor protective enclosures, a discussion on use of silicone in insulating materials and in coatings for atmospheric protection. Electric Machinery Mfg. Co.

104 Isolated Phase Bus—Twenty-pp Booklet B-5906 describes features and applications of isolated phase bus, a means for increasing safety, service continuity, and equipment protection on circuits with high short-circuit capacity. Many typical installations are shown. Equipment available for service from 15 to 69 kv is presented. Design and construction details are described with drawings and photos, and ratings and dimensions included. Westinghouse Electric Corp.

105 Distribution Transformers—Publication GEA-6070, 24 pp, on distribution transformers, covers their design features, advantages of impulse testing, nitrile rubber gaskets, Strenicor terminal clamps, bushing terminals which handle both aluminum and copper conductors, other construction details. Includes cutaways, cross-sections, graphs, diagrams, photos and other illustrations. General Electric Co.

106 Electrical Distribution Systems—"Cornerstone — or Tombstone," a 24-pp booklet on electrical distribution systems, points out advantages of matching modern services with modern electrical power — service continuity, good performance, safety, and flexibility. Basic elements of an electrical distribution system are described in non-technical language. Diagrams and sketches show how these elements fit together to provide a planned electrical system. Booklet presents four typical systems for modern buildings — low-voltage radial, high-voltage radial, spot, and distributed networks. Westinghouse Electric Corp.

107 Electrical Operation Troubles?—Symptoms and remedies for electrical failures in office and industry are discussed in a humorously illustrated 16-pp brochure, "Electrical Operation Headaches — How To Cure Them and Profit." Directed at saving management time and money, booklet considers such problems as wiring, lighting telecommunications, safety equipment, electronics. B. Eichwald & Co.

108 Stationary Batteries—Specification Bulletins CP-536 and CP-537 cover a complete line of lead-calcium and lead-antimony batteries for control, switchgear, and auxiliary power applications. The specifications include data on battery ratings and capacities, details of design and construction, dimensions, weights, and types of containers. C & D Batteries, Inc.

109 Silver-Zinc Batteries—This 6-pp brochure describes company's Silver-Zinc batteries in both single cell and multiple cell construction. Lists such features as uniform discharge of voltage, high drain rates, high output per unit volume. Contains technical data charts of primary and secondary batteries. AMF Contract Div., American Machine & Foundry Co.

VALVES, PIPING, FITTINGS

110 Altitude Valves—Sixteen-pp Bulletin W-4 describes cushioned altitude control valves designed to assure accurate water level control in elevated tanks and reservoirs. Generously illustrated, this booklet covers operating sequence, installation arrangements, dimensions; includes general instructions and parts list. Golden-Anderson Valve Specialty Co.

111 How to Handthread Pipe, Tubing—Data Card TDC 147, is intended to assist pipe fitters in threading stainless tubular products with hand tools on job sites or provisional shops away from machine threading facilities. Discusses die stock, dies, speed, cutting oils, assembly of threaded joints. Tubular Products Div., The Babcock & Wilcox Co.

112 Swivel Fittings—Catalog FS-107, well illustrated with photos and sectional drawings, shows two types of manufacturer's small size high pressure and high temperature ball bearing swivel fittings, in sizes from ⅜ to 1 in., and from working pressures of 6000 lb psi at 225 F to 1250 psi at 750 F. Describes method of construction and application, gives dimensions, specifications, weights. Emsco Mfg. Co.

PUMPS, COMPRESSORS

113 Industrial Pumps—Industrial Catalog I-54, 108 pp, describes practically all of manufacturer's industrial pumps, including large capacity, deep well submersible pumps for wells 4- and 6-in. ID or larger, two-bearing and suction centrifugal pumps, Motormount centrifugal pumps for sprinkling and air conditioning applications, and pumps for boiler feed service. Contains information on construction features, performance tables (belt and motor-driven) and selection tables (motor-driven). Includes weights and measures, comparative equivalents of liquid measures and weights, comparison of pressures, other conversion factors. The Deming Co.

114 Screw Pumps—Described and illustrated in 6-pp Bulletin WQ-S206 are screw pumps of the double external bearing and gear type and the double external bearing and gear hopper type. Bulletin gives design details, application suggestions, and dimensional data. Warren Steam Pump Co., Inc.

115 Compressor Maintenance—Locating troubles in vertical water-cooled air compressors is discussed in Mailer L-676-M1, one of a series of "Trouble Savers" on preventive maintenance designed to help manufacturers reduce their operation costs. Explains reasons for operating troubles as failure to deliver air, insufficient pressure and capacity, vibration. Worthington Corp.

INSTRUMENTS, CONTROLS

116 Electronic Controls—Bulletin F 6437, 24 pp, complete with simplified diagrams, explains fundamentals of electronic temperature controls and their application. Discusses bridge circuit, sending elements, type of controls, control applications. Includes on-off temperature control, humidity, outdoor reset hot water control. Barber-Colman Co.

117 Meters, Controls—Meters and controls, including transmitters, indicators, and recorders are described and illustrated in the 16-pp new edition of company's Bulletin 17. Gives specifications for measuring, receiving, controlling 18 process variables. Bailey Meter Co.

118 For Telemetering—A new edition of Bulletin M1710, 44 pp, illustrated by almost 100 photos and line drawings, describes company's complete line of Metameter telemeters and accessories. Features telemetering over telephone circuits, carrier current and private wires, Microwave telemetering. Shows how Metameter telemetering may be applied to measurement and transmission of pressure, flow, liquid and water level, mechanical motion, electrical units. The Bristol Co.

119 Telemetering Equipment—Instrumentation Data Sheet 9.1-9a describes electric telemetering equipment for high speed transmission of system variables to a central location. Tells how company's ElectroniK indicating, recording and totalizing instruments can be incorporated at various points in system. Tells how transmitter and receiver are interconnected by microwave equipment, power line carrier facilities or two-wire connecting line and gives specifications of a transmitter and receiver. Minneapolis-Honeywell Regulator Co.

120 Thermostatic Temperature Regulators—Bulletin S-6, 12 pp, on company's Type "S" thermostatic temperature regulators, tells where and when to use direct acting, reverse acting and three way type thermostatic temperature regulators. Lists typical engineering specifications, explains where and how to use single and double seated valves. Illustrated with cutaway photos, diagrams and tables, bulletin gives whys and hows of temperature ranges, capacities. Lawler Automatic Controls, Inc.

121 Water Level Indicators—Bulletin WG 1824, 20 pp, revised, describes three models of remote liquid level indicators for boilers, heaters, storage tanks and other vessels in industrial process plants, for boiler pressures up to 700, 1500 and 2500 psi respectively. New additions in this catalog include a wide vision dial, electronic secondary indicators. Booklet explains how indicator is used, gives typical applications, wiring diagrams. Discusses Hi-Lo Alarm Signals. Yarnall-Waring Co.

122 Pressure Recorders—Bulletin 6-10, 24 pp, describes a line of pressure instruments designed for direct measurement, remote transmission and automatic control. An application chart shows wide choice of element materials available. Ranges are listed for each material and type of element. Bulletin also describes case and linkage features, lists charts for standard process ranges, and covers accessories such as pulsation dampeners. The Foxboro Co.

123 Viscosity Meter—Eight-pp Bulletin V-1000E describes and pictures company's Viscometer which automatically measures, records and, where desirable, controls the viscosity, of practically any industrial solution. Explains operation of the instrument, discusses in detail the recorder and measuring element. Lists major advantages afforded. Norcross Corp.

124 Controls for Package Boilers—Specifications for the fully automatic, electric metering type packaged control for shop assembled boiler are given in Bulletin 54-1088-239. Schematic drawing shows typical packaged control system for a combination oil and gas fired boiler. The Hays Corp.

Reader Service Cards for ordering bulletins are on pages 205-206. Be sure to include your name, job title, and company.

125 Signalling, Intercom Systems—A representative selection from this company's broad line of signalling and intercom equipment is described and pictured in this 6-pp bulletin. Includes amplified intercom systems, plug-in units, warning signal equipment, sirens, call-to-talk systems. Graybar Electric Co.

126 Ultrasonic Burglar Alarm Device—Burglar detection equipment which employs ultrasonic sound is described in this 12-pp booklet. Tells how the ultrasonic alarm saturates entire area from floor to ceiling with a signal that will trigger at the slightest movement, tells how equipment can be tailored to suit specific needs; stresses its flexibility of application and installation; explains manner in which sensitivity may be regulated to suit special conditions. Walter Kidde & Co., Inc.

BOILERS, BURNERS

127 Automatic Boilers—Bulletin BE-4 describes operation and advantages of Continental automatic boiler's spinning gas technique—a method of obtaining maximum heat transfer with a simplified design. Shows cutaway view of boiler construction; illustrates hinged doors and method of injecting air through static, turbine-like vanes into burner. Boiler Engineering & Supply Co., Inc.

128 **Efficient Little Boiler**—Bulletin AD-135 describes company's CB-50-80 boilers available in 50 to 80 hp (15 to 150 lb steam, 30 lb hot water) for heating and processing. Stresses such advantages as silent operation, fuel flexibility, speed, easy maintenance, and automatic operation. Discusses new hinged front and rear doors, forced draft systems, other features. Cleaver-Brooks Co.

129 **For Lower Steam Costs**—Have you Checked Your Steam Costs Lately?" is a 16-pp, non-technical picture and caption presentation; it serves to focus attention high-cost features of antiquated boiler equipment. The first part of the booklet emphasizes typical boiler plant problems. The latter part illustrates packaged automatic boiler installations in industrial plants, others. Orr & Semlower, Inc.

130 **Packaged Boilers**—Eight-pp Brochure WT-7 provides operational information and specifications on packaged boilers designed to meet steam requirements in the pressure range of 4100 to 50,000 lb of steam per hour, and for gas, oil or combination firing. Engineering data and photos are included. Wm. Bros Boiler and Mfg. Co.

131 **Heavy-Oil Burners**—Bulletin 175-H, 8 pp, describes company's heavy-oil burners (belt driven horizontal rotary type) with 7½ to 175 gal capacity. Includes such information as nominal burner specifications, electrical characteristics of standard equipment, lists standard equipment for automatic, semi-automatic burners. Preferred Utilities Mfg. Corp.

WATER CONDITIONING

132 **Boiler Water Treatment**—Need for proper "designing" of mineral content of boiler water to prevent losses due to corrosion and scale is described in a 6-pp bulletin. Discusses methods of research and pretreatment of water, knowledge required to determine what is needed to make steam of the required purity at minimum cost, maximum protection against boiler failure. Hall Laboratories, Inc.

133 **Steam-Water Cycle Deposits**—In the application of analytical techniques for identification of deposits found in steam-water cycles, constituents are normally reported by mineral names rather than chemical formulas. As a means of promoting a better understanding of such analyses, Bulletin 28x8155 provides a tabulation giving mineral name, chemical formula, usual areas in which deposits are found, normal causes, and suggested preventive measures. Allis-Chalmers Mfg. Co.

CONSTRUCTION AND MAINTENANCE

134 **Roofing and Siding**—Catalog 100, 24-pp, presents roofing and siding products, standing seam roofing, weatherboard siding, flashing and roll valley, gutter and downspouting. Introduces cross corrugated roll aluminum roofing, which comes in rolls for easier application, and can be cut to a plant engineer's specifications. Includes product specifications and installation instructions. Catalog can be inserted into binder, and additions will be issued later. Quaker State Metals Co.

135 **Roofing, Then and Now**—A brief history of roofing, treated in a light-hearted fashion, is presented in this 20-pp humorously illustrated, pocket-sized booklet. Depicts progress in roofing industry from earliest ages to discovery of Glasfab, company's roofing membrane made from fiber glass. Compares Glasfab to previous materials and points out its qualities of strength, open mesh construction, durability. Twinsburg-Miller Corp.

136 **Aluminum Wall System**—This illustrated bulletin describes Reynowall, an insulated aluminum wall system consisting of an exterior aluminum skin and an interior wall panel attached on opposite sides of steel girts. Tells where this wall is used to advantage. Discusses economy, minimum maintenance, fire resistance, other features. Includes specifications, installation procedure. Reynolds Metals Co.

137 **Movable Steel Partitions**—This 8-pp catalog presents company's Movable, Mobilrails, and Mobilscreens for use in steel interiors and partitioning installations. Describes various types of partitions available, such as those for use in noisy areas, and types for use in fire-hazardous areas. Shows how steel rails and screens define work areas, create semi-private space, control traffic, increase efficiency. Includes specifications, installation suggestions. Virginia Metal Products, Inc.

138 **Why Scale Models**—The ten major functions of scale models as engineering tools in industrial plant construction projects are detailed in this 6-pp bulletin. Their use in observing faults to be overcome, in familiarizing operating crews with the new plant, in enabling erection crews to solve problems before work is started, in cost estimating are among functions described. Photos show several models. Project Models Co.

139 **Paints for Metal-Working Plants**—A full line of metal-working maintenance paints in 10 categories, with where-and-how-to-use outlines, is presented in this 28-pp catalog. Paints especially suited for metal-working plants, including fume-resisting paints, non-yellowing whites and acid-resistant floor finishes, are described as to coverage, solvents, spraying, brushing. Flexrock Co.

140 **Non-Shrink Mortar**—The successful grouting of heavy equipment with Embeco non-shrink motor is described in a 16-pp Bulletin E-lc. Outlines and illustrates what this mortar is, some common methods of grouting different types of equipment, mixing and placing of grout, cold and hot weather grouting, and measurable characteristics of the mortar. Contains data on recommended mixes; estimating tables, illustrations of some installations. The Master Builders Co.

141 **Steel Scaffolding**—Sixteen-pp Catalog 56 covers in detail all component parts used for the erection of this company's steel scaffolds and materials hoisting towers. Locking devices, panels, braces, accessories are described and illustrated. Some typical assemblies are sketched, and photos show scaffolds in use in construction, modernizing, and maintenance work. Advance Scaffold Div., Beaver Art Metal Corp.

142 **Improved Sweepers**—Power sweepers designed for efficient and economical dust and debris control are described as to construction and features in this 10-pp illustrated bulletin. Provides specifications and prices on a general industrial model and a heavy-duty power sweeper. Modern Mfg. Co.

METALS, CASTINGS

143 **Continuous-Cast Bearing Bronze**—This bulletin describes five ways in which use of Asarcon 773 continuous-cast bearing bronze results in greater economy; it can be bought from stock in any desired length; is available in any diameter and in cored bars; takes less machining time to clean because there is less metal to be removed; has no porosity; and it affords reduced downtime. Bulletin also describes method of making Asarcon. American Smelting and Refining Co.

On pages 205-206 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

144 **On Ductile Iron**—"Effect of Chemistry and Section Size on Properties of Ductile Iron," is title of 12-pp Bulletin DI-16. Discusses influence of carbon, silicon, and phosphorous contents and of section size on the mechanical properties of ductile iron, a recently developed family of irons which possesses the process advantages of cast iron and which has engineering properties comparable to those of cast steel. Shows how a wide range of properties may be secured by variations in heat treatment and composition. International Nickel Co., Inc.

145 **Chart on Aluminum Designations**—This handy wall chart shows the new four-digit designation system for wrought aluminum and wrought aluminum alloys developed by the Aluminum Association. A conversion guide shows old and new designations in easily-read type. Designed as a permanent reference, it may be kept on the wall or in a binder. Kaiser Aluminum & Chemical Sales, Inc.

146 **Hard Metal Castings**—In addition to providing information on the use of hard metal castings, specific details on those offered by this company, types available and their identification, this 16-pp catalog devotes much of its space to unretouched photos of current specimens. The booklet, now offered in its second edition, shows more than 20 such specimens, including shaft bushings, liners, rolls, valve seats. Stoody Co.

TOOLS, WELDING, MACHINE SHOP EQUIPMENT

147 **Hand Torches, Tips**—Catalog ADC 702B, 36 pp, covers company's line of torches and tips for oxyacetylene cutting and welding, listing every Airco standard torch and tip along with necessary mixers, extensions, adapters and accessories that are used with the torches. Material is presented through illustrations, charts and descriptions. Air Reduction Sales Co.

148 **Machine Tool Attachments**—Catalog 5418, 40 pp, illustrates and offers full specifications on a line of machine tool attachments and accessories. Includes those for company's precision toolroom and engine lathes (9-in. through 16 to 24-in. swings), turret lathes, drill presses, 7-in. bench shaper and 8- or 10-in. pedestal grinders. Catalog provides a ready source of features and design data on the attachments. South Bend Lathe Works.

149 **Welding, Cutting Equipment**—General Products Catalog ADC 662B, 52 pp, covers Airco gases, welding and cutting equipment and accessories—torches, tips, regulators, electrodes. Also includes such recent developments as Aircospot inert-gas spotwelding. Catalog explains how each item operates and the jobs to which it is best suited. Complete specifications supplied. Air Reduction Sales Co.

150 **Arc Welding Electrodes**—Descriptive information, chemical and physical data, recommended procedures and engineering data on Murex mild steel and low alloy arc welding electrodes—some 19 types in all—are provided in this 36-pp catalog. Arranged for easy selection and reference, booklet includes helpful general information on steels, and on preheating practice; includes estimating data, hardness comparison tables and chart showing welding symbols. Metal & Thermit Corp.

151 **Metal Cutting Tools**—Provided in this 40-pp illustrated catalog is application and ordering information on modern metal cutting tools. Describes inserted blade milling cutters for medium- and heavy-duty applications, carbide milling cutters, carbide single point tools, replacement blades, locks and screws for the cutters, special tools and accessories. Provides dimensional data and includes tables showing carbide grade recommendations for metal cutting operations. Viking Tool Co.

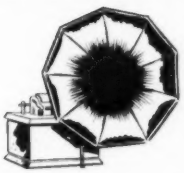
152 **Polishing, Buffing Lathes**—In addition to describing 10 models of constant speed lathes, 8-pp Bulletin TP-55 also presents four models featuring variable speed operations, available in many instances in optional speed ranges. Booklet contains a comparative chart outlining standard specifications and features of each model. Frederic B. Stevens, Inc.

153 **Grinding Wheels**—Illustrated Catalog 1052, 28 pp, on grinding wheel selection, covers abrasive types, bonding materials, wheel speeds, wheel markings, standard wheel shapes, mounted points, and abrasive polishing grain. Principal feature of catalog is supplement of net prices. Tables giving wheel specifications for hundreds of applications serve as guide for wheel selection. Norton Co.

154 **High Production Blast Machine**—Sixteen-pp Bulletin 225 carries complete specifications and dimensions for Blastmaster barrels from 1½ cu ft to 27 cu ft size. Illustrates various features of this high-production-rate blast machine—designed specifically for newer abrasives, for batch cleaning of castings, forgings and heat treated parts—and shows how production savings may be realized. Dimensional plan views and elevations, maximum weight per piece and per load, and motor specifications are given. Pangborn Corp.

(More Bulletins on page 207)

Gilmer V-Belts have this BIG advantage!



REMEMBER how the invention of the radio amplifier opened the way for the ultimate perfection of the much older mechanical phonograph? In much the same way, the invention of the Gilmer "Timing"® Belt has contributed to the present perfection of its older teammate, the Gilmer V-Belt!

During the past decade, while developing and improving the first successful molded-tooth belt, Gilmer engineers explored and tested countless combinations of new design ideas, synthetic rubber formulations, textile fabrics and cord compositions . . . uncovered much that was applicable to V-Belts as well as to "Timing" Belts!

Many of these tougher, better-gripping, cooler-running rubber compounds, longer-wearing cover fabrics and stronger cords of man-made continuous filaments have been incorporated into Gilmer V-Belts. But, since these improvements did not occur all at one time, we have never gone so far as to announce a "new line" of Gilmer V-Belts. However, you can be sure that the Gilmer V-Belts you buy today, from your NYB&P-Gilmer Distributor, embody the most advanced materials and proved designs to provide maximum performance and service life.

Let your nearby NYB&P Distributor fill all your V-Belt needs! If he is not listed in your local classified directory, write for his name to address below.

Gilmer V-BELTS and "TIMING"® BELT DRIVES

NYB&P INDUSTRIAL RUBBER GOODS

NYB&P — NEW YORK BELTING & PACKING CO. (Founded 1846)

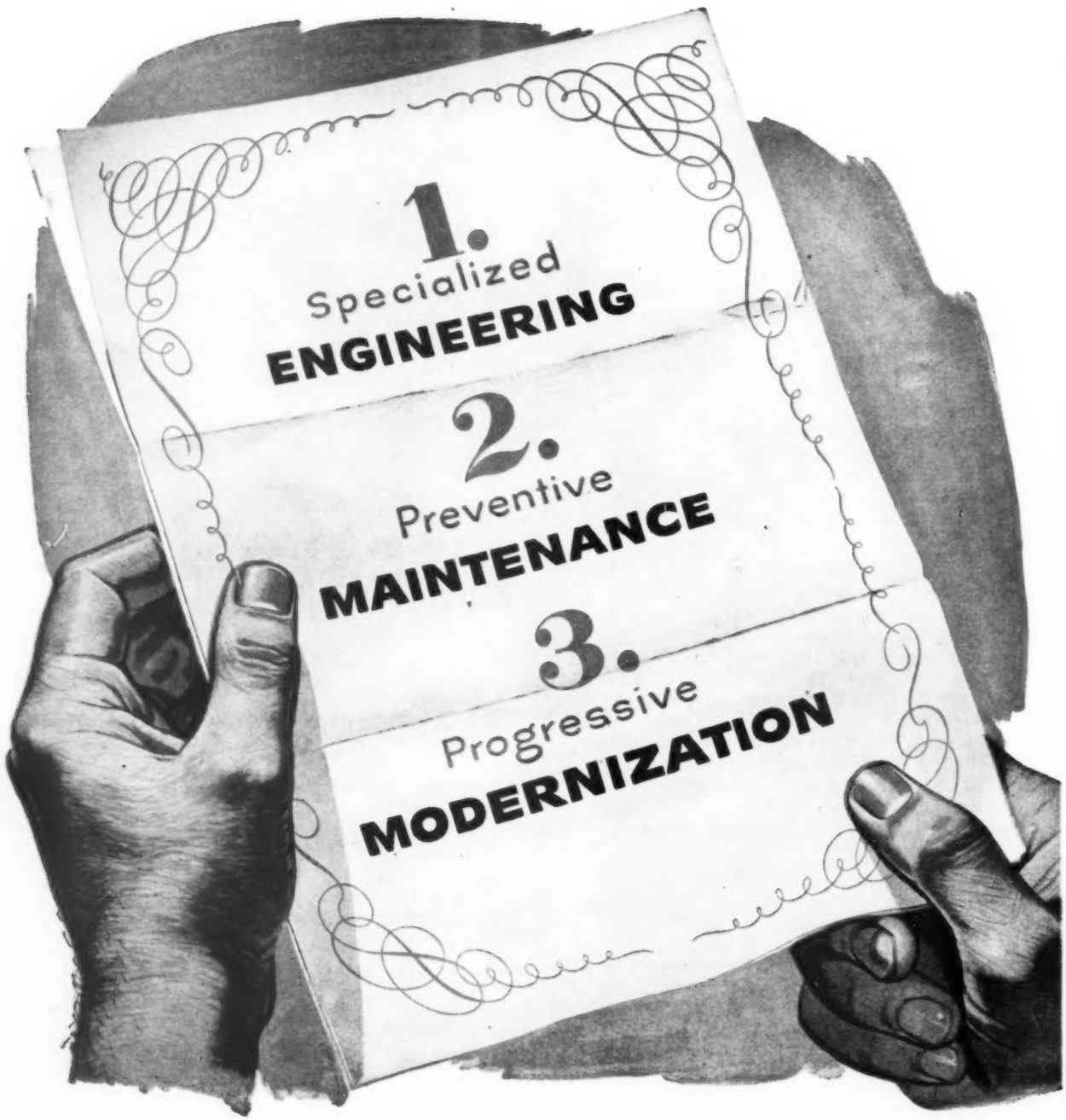
NEW YORK BELTING & PACKING CO. 1 Market St., Passaic, N. J.

America's Oldest Manufacturer of Industrial Rubber Products

For more facts circle 517 on Reply Card

Always-On-Duty

OTIS GENERAL DUTY FREIGHT ELEVATORS

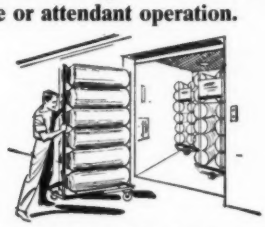


"INSURANCE"

HAVE THREE EXTRA FACTORS OF SAFETY

Whenever you need a freight elevator, it should be on duty. It's like a watch. If it isn't running it's useless. And costly. Especially when lack of elevator service holds up a production or materials handling line, or warehouse delivery trucks, or automobile parking, or mining, etc.

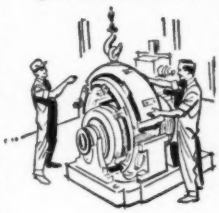
You can save money in the long run with Otis general duty freight elevators. They're standardized. They have lifting capacities of 2,500 up to 10,000 lbs. or more. And full safety features, power doors, self-service or attendant operation.



Only Otis freight elevators can offer you always-on-duty "insurance." It's based upon these 3 extra factors of safety.

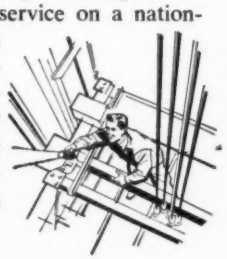
1 Specialized ENGINEERING

Otis hoisting machines, which are the heart of the installation, are not adaptations of standard commercial equipment. Like every other part of an Otis installation, they're specifically designed to meet the unique requirements of elevator service. And every part is built in Otis plants under rigid quality control. All with a basic knowledge of elevatoring that can't be matched.



2 Preventive MAINTENANCE

Otis maintenance keeps Otis freight elevators performing like new—*year after year!* Otis service is *engineered-service by the maker* that prevents slowdowns and breakdowns; extends elevator life by 50%; eliminates expensive, unexpected repair bills; keeps replacement parts available over 60 years; supplies field-trained men, having an aggregate of 21,500 years' elevator experience; provides 24-hour-a-day service on a nationwide basis through 268 offices. All, because we never lose interest in the performance of an Otis installation.



3 Progressive MODERNIZATION

An Otis freight elevator need never become obsolete. New developments are made applicable to existing installations. We strongly recommend planned, progressive modernization as always-on-duty "insurance."

AUTOMATION

You can have freight elevators where you want them, when you want them. The same advanced electronic skill *that developed AUTOTRONIC® completely automatic operatorless elevators for busy office buildings* is ready to make completely automatic freight elevators an integral part of your production line.

* * *

Our broad experience in the field of industrial elevatoring qualifies us to advise on standard or special adaptations of Otis elevators for unusual freight handling requirements. This experience is available for any size installation, however large—or small. Call any of our 268 offices for details.

Otis Elevator Company
260 11th Ave., New York 1, N. Y.

Otis FREIGHT ELEVATORS

HEAVY DUTY · GENERAL DUTY · LIGHT DUTY

For more facts circle 518 on Reply Card

For the industrial lighting value of your lifetime

See! Examine! Compare!

THE NEW LIFETIME CFI SERIES

Day-Brite announces the sensational new CFI-25 with 25% upward component and the CFI-10 with 10% upward component—both with important new features that promise a lifetime of unparalleled lighting performance.

From Day-Brite, the pioneer, came many of the early developments in uplighted industrial fixtures.

Now — from Day-Brite, the leader, comes a great new advancement in industrial lighting — the new *Lifetime CFI series.*

Today, the CFI-25 brings you all the desirable comfort benefits of 25% uplighting *within a practical price range.*

This is a goal sought by many in the lighting industry. A few manufacturers have actually marketed 25% uplighted fixtures. Until now, none had succeeded in keeping fixture costs within reasonable limits.

Day-Brite—and only Day-Brite—offers you advanced visual comfort for industry at an economically justified price. If you can afford *any* industrial lighting, you can now afford the lifetime benefits of the finest fixtures ever to reach the market.

See! Examine! Compare!

FULL 8-FOOT PORCELAIN REFLECTORS! An exclusive *Lifetime CFI* feature! Competitive fixtures give you two 4-foot reflectors to form an 8-foot section — twice as many pieces to handle during installation, twice as many joints to interfere with alignment of runs. Another exclusive: every square inch of reflection surface is finished in snow-white Lifetime porcelain enamel. Apertures die-embossed for strength and appearance.

CFI-25 REFLECTOR SUPPORTS 358 POUNDS! Here's a rugged test for any reflector. Supported only at its extreme ends, the 8-foot CFI-25 reflector remains perfectly straight and rigid bearing the full weight of a 358-lb. man—no bend, no sag, no spread. That's because new ribbed construction reinforces lateral stability and a longitudinal "V" louver reinforces lengthwise rigidity (and also provides comfortable 30° cross-wise shielding). These super-rigid reflectors assure straight, true alignment of fixture runs.

See! Examine! Compare!

Complete details of the CFI-25 (left) are covered in Bulletin OD-626. The CFI-10 (right) is described in Bulletin OD-625. Write for either or both today! Day-Brite Lighting, Inc., 5439 Bulwer Ave., St. Louis 7, Mo. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

See! Examine! Compare!

You must see this revolutionary new industrial series yourself to appreciate the lifetime advantages it offers. Examine the CFI-25 and the CFI-10. Compare them with other industrial fixtures. Mark your calendar now to arrange a *Lifetime CFI* demonstration—and know firsthand why this new series is the industrial lighting value of your lifetime!

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

496

SEE YOUR LOCAL ELECTRICAL CONTRACTOR

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FORWARD!
by
LUBRIPLATE LUBRICANTS

The introduction of LUBRIPLATE Lubricants established a new high standard for industrial lubrication. Now, a recently patented improvement in the production of LUBRIPLATE results in even greater lubrication efficiency. Under today's operating costs, reduction of down time, less parts wear and replacements, as well as lower power consumption, far outweigh any differential in the initial cost of LUBRIPLATE Lubricants.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Write for your free copy of the new and enlarged LUBRIPLATE DATA BOOK—a most valuable treatise on modern lubrication!

LUBRIPLATE DIVISION
Fiske Brothers Refining Co.
Newark 5, N. J. • Toledo 5, Ohio

For more facts circle 520 on Reply Card

BACKTALK about our past issues

Edited by R. L. Marinello

Nederland Plant Engineers' Society

PLANT ENGINEERING:

"On my recent visit to your country I had the opportunity to visit some of the local Plant Engineering Societies, and I was very interested in their work.

"The amalgamation of the various American local societies into the American Institute of Plant Engineers is a fine achievement that will still further the national and even international cooperation.

"We in the Nederlands are trying to get together to form a similar organization, and I hope to be able to send you more details on this subject in the near future.

"You can help us in finding the way by sending me the written by-laws of some local institutes and their working-outlines.

"With all my best wishes for the further development of the A.I.P.E. and with many thanks in anticipation." *E. W. Schultz, Stichting Centrale Onderhoudsdienst voor de Textielindustrie in Twenthe, Hengelo, Nederland.*

▶ We are pleased to hear of your interest in forming a Nederlands Plant Engineers' Society, and we want to wish you and your constituents the very best of success. We are sending you several booklets which we use to explain how the societies are formed. We feel that the material in these booklets will be of help to you, and we are indeed pleased to make them available.—*Editors.*

Reserves Copy of Reprint

PLANT ENGINEERING:

"I am in receipt of your letter in which you enclosed a copy of the May, 1954 'Construction Briefs.' The effort that you have put forth is sincerely appreciated. The planning that you are working into PLANT ENGINEERING has resulted in its being the 'most read, most referred to' magazine in our organization. The 'Construction Briefs' section is one good example.

"I would appreciate your reserving a copy of the reprint series of the 'Construction Briefs' that you are now assembling." *John S. Duder, F. H. McGraw & Co., Salt Lake City, Utah.*

Two Requests—Same Articles

PLANT ENGINEERING:

"Please send to the attention of the writer one reprint of each of the following articles appearing in the December, 1953 issue:

"'Nomograph Helps to Determine Economical Ordering Quantity' by Martin H. Saltz; and 'One Approach to Incentive Systems for Maintenance Workers.' by Tom Adams." *P. F. Hinchcliff, Plant Librarian, Columbia-Southern Chemical Corp., New Martinsville, West Virginia.*

PLANT ENGINEERING:

"I would very much appreciate receiving two copies of the following articles: 'Nomograph Helps Determine Economical Ordering Quantity,' and 'One Approach to Incentive Systems for Maintenance Workers.'

"Both of the above articles appeared in the December, 1953 issue." *A. C. Siegel, Manager, Manufacturing Engineering, Radio and Television Department, General Electric Co., Electronics Park, Syracuse, New York.*

Interest in LPG Conversion Kit

PLANT ENGINEERING:

"We have just read with great interest your article entitled 'How About LPG as Industrial Truck Fuel?' in the August issue of PLANT ENGINEERING. In this article reference is made to kits that are available for converting gasoline engines to LPG.

"We would appreciate any information that you might be able to furnish us as to the names and addresses of manufacturers of such kits." *E. H. Cushman, Assistant Manager, Mexican Zinc Co., S. A., Rosita, Coah, Mexico.*

PLANT ENGINEERING:

"The August issue contained an article on LPG as an industrial fuel, and we are very interested in obtaining more information on the subject, particularly the supplier of the conversion kit described in the article plus all allied information." *L. J. Neville, Purchasing Department, Marinette Paper Co., Subsidiary of Scott Paper Co., Marinette, Wisconsin.*

▶ We are forwarding your inquiries to the manufacturer, The Parksdale Co., asking them to send you more information on these conversion units.—*Editors.*

Flow of Granular Materials

PLANT ENGINEERING:

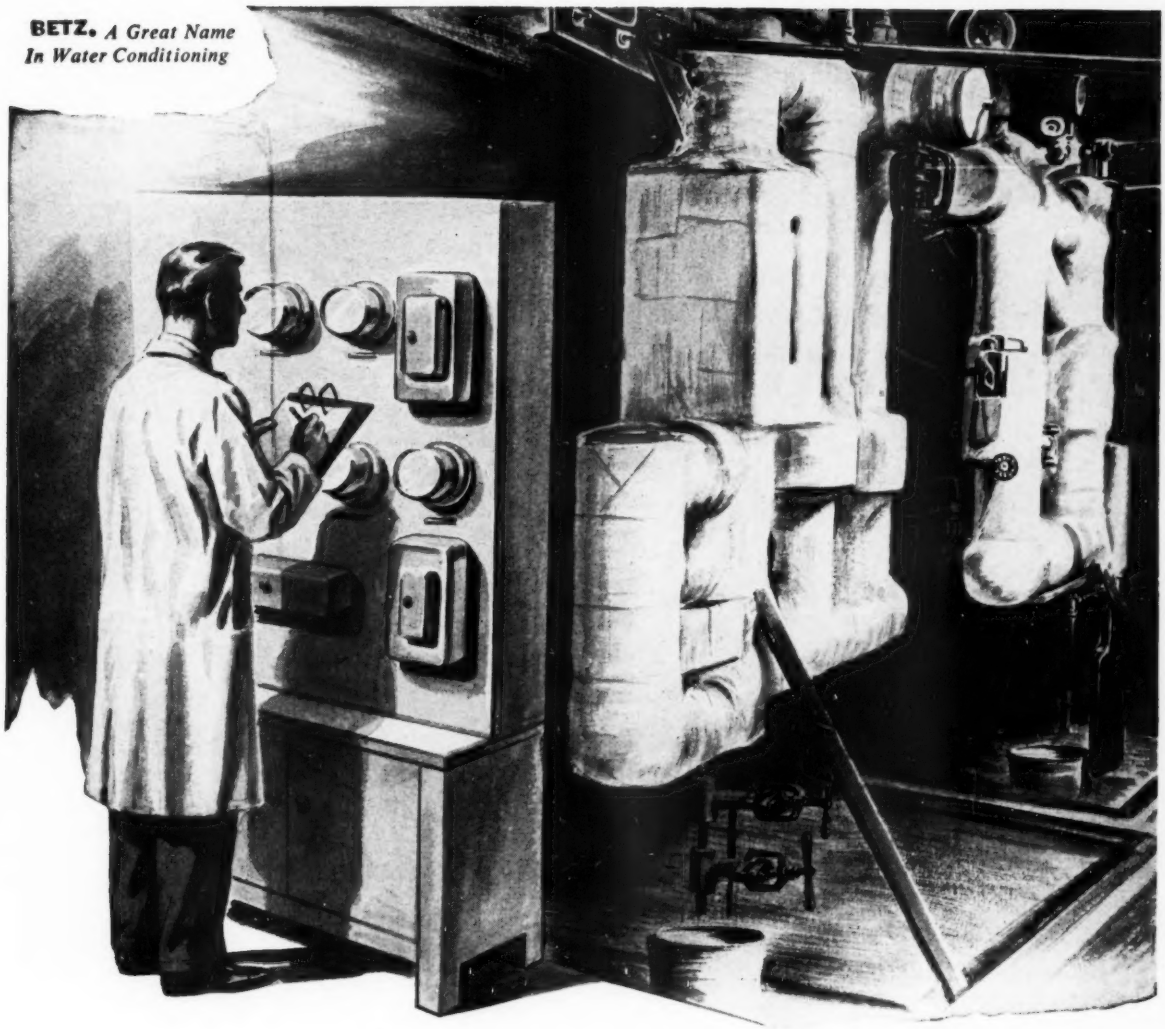
"The June, 1953 issue of PLANT ENGINEERING carried an article by J. E. Nissley 'Funnel Improves Granular Flow.'

"At the time it was published it was difficult to rationalize design on a theoretical basis. Recent developments give a sound basis for the idea and may help in further applications.

"Quite a few years ago Janssen set up a differential equation which when integrated on the basis of a constant diameter (as for a grain silo) gave the familiar formula for pressure in deep bins. There had never seemed to be any point in applying that theory to shallow bins such as hoppers. However, study of hopper design in general suggested such an application might have value.

"For a hopper the mathematical treat-

BETZ. *A Great Name In Water Conditioning*



Proving ground for an idea

Many of today's industry-accepted water conditioning techniques were unknown just a few short years ago. Yet they were made possible by the extensive research which is carried on daily at our headquarter laboratories in Philadelphia.

Little wonder then, that we consider our *continuing* program of research and development so important.

The testing and retesting of new chemical compounds and formulations—*under actual plant conditions* in complex "Tom Thumb" equipment like this—is only a small part of our research program conducted to assure better water conditioning for industry.

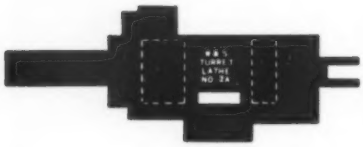
As a result, advanced Betz discoveries, tested in the laboratory and *job-proved* in the field, have vastly increased operating efficiency and economy in industrial plants, petroleum installations, and institutions—everywhere.

W. H. & L. D. BETZ, Gillingham & Worth Streets, Philadelphia 24, Pa. In Canada: BETZ Laboratories Limited, Montreal 1.

BETZ

CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

For more facts circle 521 on Reply Card



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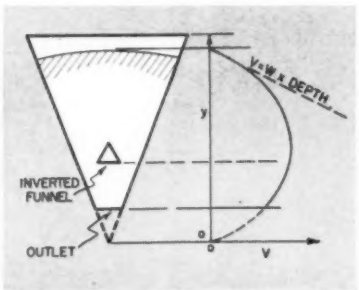
BACKTALK

ment is more complicated and will not be discussed in detail. The equation is stated below for those who may be interested:

$$\frac{dV}{dy} = \left(W - \frac{\tan \Theta \times kV}{R}\right)$$

V = vertical pressure
kV = lateral pressure
R = hydraulic radius (area/perimeter) at height y
W = density (lb per cu ft) of material

"The equation has the same theoretical basis as the original Janssen equation



Typical design showing pressure curve

successfully used for silos 100 ft deep. It received verification on an experimental basis from a paper read before the June ASME meeting at Pittsburgh, by Mr. A. W. Jenike, Professional Engineer, Salt Lake City, Utah. (ASME paper No. 54-SA-34.) For any given depth of material, pressure curve starts out tangent to the hydrostatic line, reaches a maximum, and curves back to zero at the apex of the hopper.

"Reference to Mr. Nissley's article shows that his inverted funnel provides an orifice at such a point that the actual pressure is appreciably higher than at the outlet. The lower part of the hopper acts as a funnel for the material passing the orifice.

"An inverted funnel may not be the solution for all materials. However, with this formula it is possible to make adjustments to suit the material being handled." *Chesman A. Lee, Evanston, Illinois.*

► Additional comments about this article appeared in the November, 1953 issue, page 28.—*Editors.*

Copies Follow Reader to Paris

PLANT ENGINEERING:

"For some years, I have been receiving your monthly publication and have found them of great assistance and interest.

"I have been assigned to take over a temporary position with our company in Paris, France, and would be pleased to receive a complimentary copy of your magazine for the months of September and October, as they will be of great assistance in selecting equipment for the plant." *Roman R. Nowakowski, Chief Engineer, Minnesota Mining & Manufacturing of Canada, Ltd., London, Ont.*

► We are placing a reminder in our follow-up file to be sure that copies of the September and October issues are sent to you in Paris.—*Editors.*

Pipe Charts Put to Good Use

PLANT ENGINEERING:

"The 'Pipe Sizing Charts' in your October, 1953 issue of PLANT ENGINEERING have been used quite extensively in our Engineering Department.

"Three more copies of these would be very much appreciated since the one copy we have on hand has begun to show much use." *L. D. Madia, Vice-President, Engineering, Oldman Boiler Works, Inc., Buffalo, New York.*

► Yours for the asking.—*Editors.*

Likes "Court Decisions" Section

PLANT ENGINEERING:

"I am, and have been for some time, interested in the cases presented in the 'Court Decisions' section which summarizes the legal findings of court rulings of direct interest to plant engineers.

"I hope you continue this section since I, personally, really enjoy it." *J. R. Haugan, Plant Engineer, Union Special Machine Co., Chicago, Illinois.*

Quality Control Article

PLANT ENGINEERING:

"I would appreciate receiving tear sheets of your interesting and informative article 'Seeburg's Tag System Controls Quality and Reduces Scrap.' This appears on page 110 of the June, 1954 issue." *R. S. Perry, Chief Engineer, Valve & Fitting Department, Henry Vogt Machine Co., Louisville, Kentucky.*

Inquiry on Plastic Ceilings

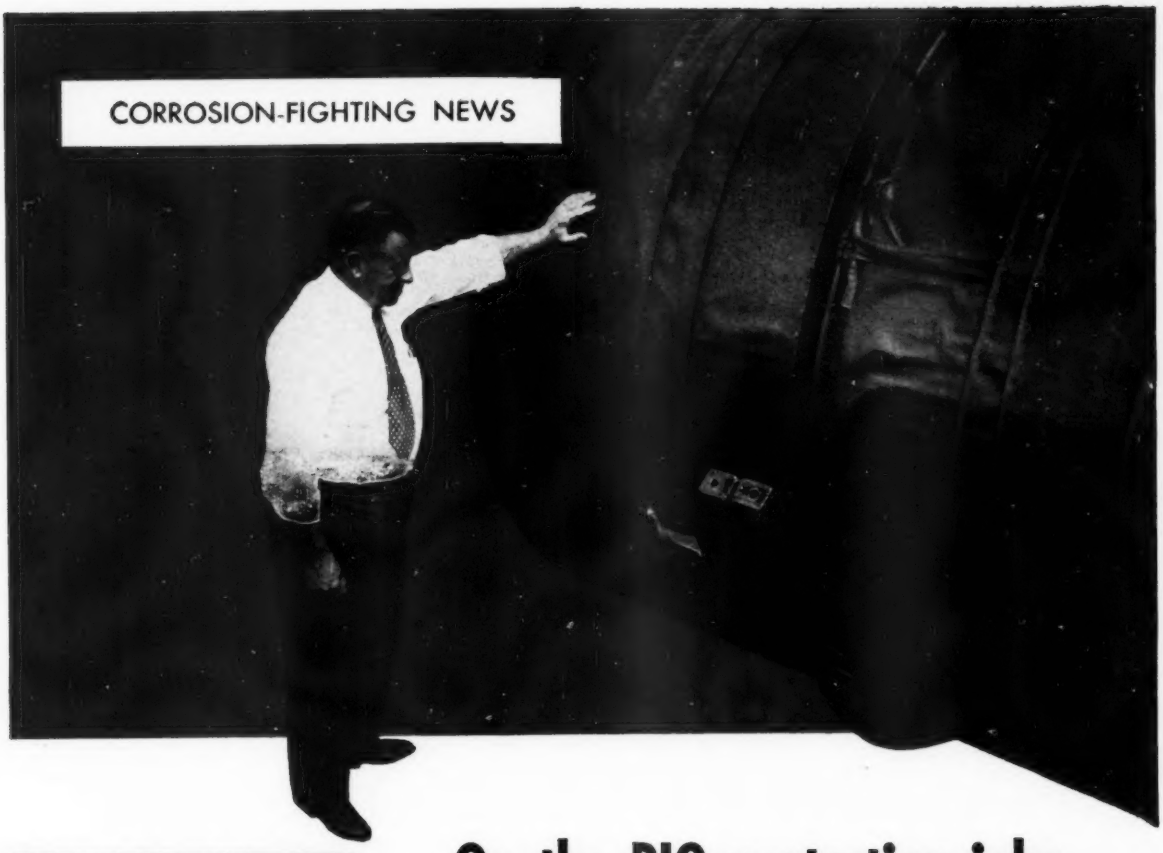
PLANT ENGINEERING:

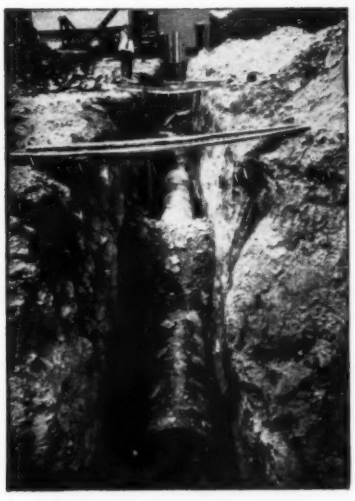
"We note with interest, an article in the August issue of PLANT ENGINEERING in connection with corrugated plastic suspended ceilings, as manufactured by Davis and Geck, Inc.

"We are unable to find an address for this company, and would appreciate your contacting them and asking them to have their local representative call to see our Mr. Andrew Neidert, of our Plant Engineering Department—Plant B. If unable to call, any literature and technical information they may have would be greatly appreciated." *K. G. Orr, Buyer, Goodyear Aircraft Corp., Purchasing Department, Akron, Ohio.*

► Davis and Geck, Inc., does not manufacture these plastic ceilings. They are being used in the Davis and Geck plant in Danbury, Connecticut. The plastic ceilings are manufactured by Luminous Ceilings, Inc., Chicago, and we are passing your inquiry on to them.—*Editors.*

CORROSION-FIGHTING NEWS





On the BIG protection jobs PITT CHEM gets the call

Positive protection against underground corrosion was a "must" on the installation of these vital 84-inch headers and 48-inch cooling water pipes at the Lewis Flight Propulsion Laboratory of the National Advisory Committee for Aeronautics, Cleveland, Ohio. This assured protection was provided by Pitt Chem Tar Base Coatings, which were specified by the project's engineers, H. K. Ferguson Co., Cleveland, and applied by the fabricators of the pipe, Bethlehem Steel Corp.

The distinct advantages of Pitt Chem Tar Base Coatings may solve many of your toughest corrosion problems:

1. They are made from one of the most impervious of all materials—cold tar pitch.
2. They are easy to apply, by brush or spray.
3. Their applied film is up to ten times as thick as ordinary paint.
4. They provide better protection-per-dollar than any other coatings available.

Our staff of corrosion engineers is at your service. Why not let one of them talk over your corrosion problems? Write today.

W&D 5128

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PITT CHEM 102—Maintenance Coating
PITT CHEM 103—General Purpose Coating
PITT CHEM 104—Potable Water Service
PITT CHEM 105 AQUATAR—A Water Dispersion
PITT CHEM 106 TARMASTIC—Sealing Mastic
PITT CHEM 107 PACHKOTE—Specialty Coating
PITT CHEM 110—Coating Sealer

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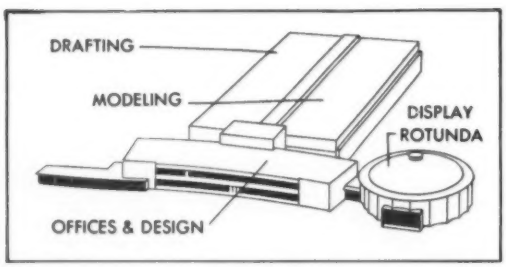
Advanced Styling Section of Ford Motor Company's new $11.5 million Styling Building, Dearborn, Michigan.

Ford "dream shop" has built-in climate!



The design-office wing and display rotunda are served by a central system. It includes: 7 supply fans; 34 exhaust fans; heating and cooling coils and sprayed-coil dehumidifiers – all furnished by American Blower.

Air for drafting rooms and modeling studios is conditioned by 24 specially built, automatically controlled American Blower Air-Conditioning Units. Each unit contains heating and cooling coils and Capillary air washers.

This "dream shop" at the Ford Engineering Staff's Advanced Styling Section is just one of many styling areas which depend on clean, conditioned air.

For example, in 12 roomy studios clay-modeling teams work under lights which produce shadowless illumination – and intense heat! To absorb this heat and provide the proper climate for working with clay models, specially designed air-conditioning systems were installed for each studio and drafting room. American Blower Air Handling and Air-Conditioning Equipment was used for this unusual assignment.

The expert know-how of American Blower engineers is on tap for industry at all times. If you have an air-handling or air-conditioning problem, phone your nearest American Blower or Canadian Sirocco Branch Office.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
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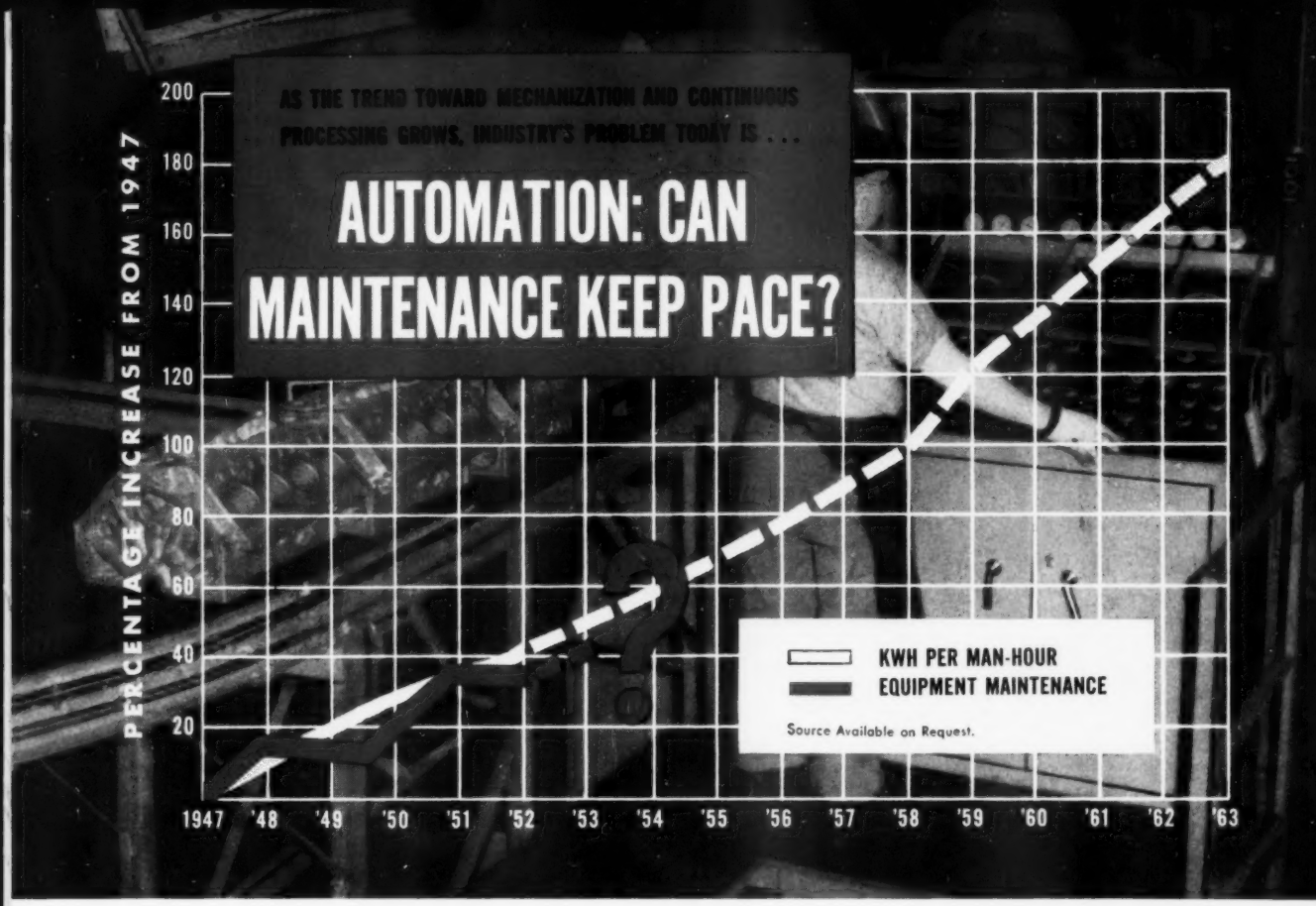


One answer is General Electric's 5-step *Productive Maintenance* plan

- **More is expected from maintenance as industry continues its drive to reduce product costs**
- **And as kilowatt-hours per man-hour hit new peaks, trends toward automation are forcing a closer look at maintenance procedures**
- **But 9 out of 10 electrical maintenance programs are obsolete in one area or another**
- **To help maintenance keep pace, General Electric offers a 5-step *Productive* Maintenance plan**

In every industry, operations are constantly being made more efficient to increase output, quality, and reduce product cost. Plant electrification is expanding . . . more continuous processing lines are being set up . . . the first steps toward automation are being taken.

To help reduce product cost, similar planning and new techniques must be applied to maintenance. For this reason, General Electric has worked out a step-by-step plan called "Productive Maintenance." With it, you can organize an electrical maintenance program that will measure up to the constant drive for more production at lower cost.

Notice that G.E.'s plan is called *Productive maintenance*, and not preventive maintenance. There's a big difference. Maintenance must go beyond any negative concept . . . to where it is fully as important as production itself.

SEE THE NEXT 7 PAGES for the five basic steps in every *Productive* Maintenance Plan, specially designed to help you deliver more production for every maintenance dollar.

GENERAL ELECTRIC

TURN PAGE FOR 5-STEP PLAN

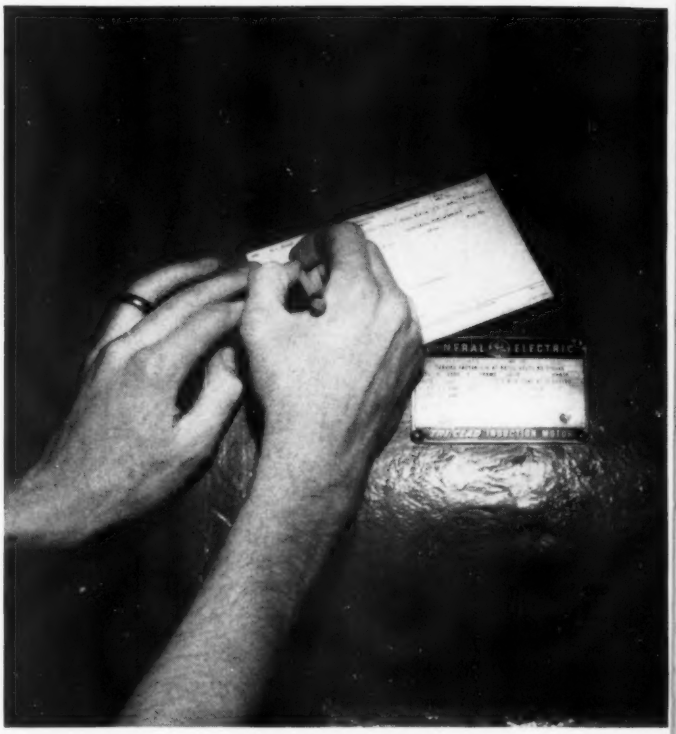
G.E.'s *Productive Maintenance* Plan

STEP 1 Gather complete equipment data

Start your *Productive Maintenance* plan by making a complete equipment inventory. The resulting record system will be a basic part of your entire new maintenance program

As your first step, determine *what* electrical equipment you have in your plant and *where* it is. An inventory number should be assigned. Usually, a system that indicates building, floor, and machine number is used conveniently for this purpose.

HERE'S WHAT YOU MUST KNOW. A well-edited record sheet or card should include a description of the equipment, application, rating, serial number, manufacturer, purchase order number, inventory number, and cost information.



TO BE EFFECTIVE, a Productive Maintenance Plan begins with a complete inventory of all plant equipment.

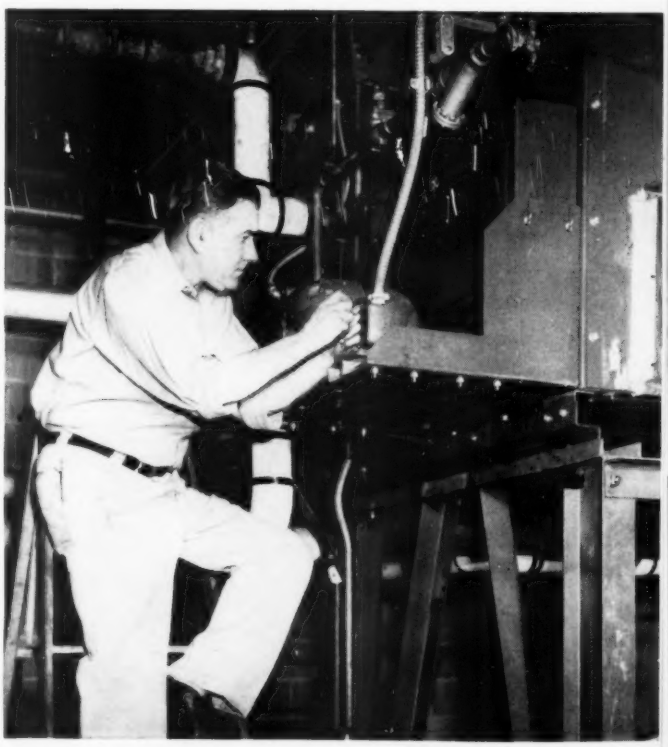
G.E.'s *Productive Maintenance* Plan

STEP 2 Determine extent of routine maintenance

Determine the amount of maintenance necessary for your electrical system. Some equipment will be excluded from the plan

Select equipment on which maintenance effort is to be expended in your program. Include only those items where *Productive* Maintenance will pay, or help make workers safe.

Anybody can do a complete routine maintenance job—but it may be unnecessarily expensive. In some cases, it will be cheaper to replace or repair a part or the entire piece of equipment after it breaks down, rather than use high-cost manpower to inspect and maintain it. Equipment that is not considered important enough to be brought into the *Productive* Maintenance plan can be repaired in answer to non-scheduled requisitions by production supervisors.



NON-CRITICAL EQUIPMENT, such as the motor for this air-conditioning unit, may not warrant being included in the plan.

G.E.'s *Productive Maintenance* Plan

STEP 3 Establish a routine operating control system

Put the equipment data you gathered in Step 1 to work. Use it to set up inspection schedules, work orders, renewal parts stocking system and to record costs

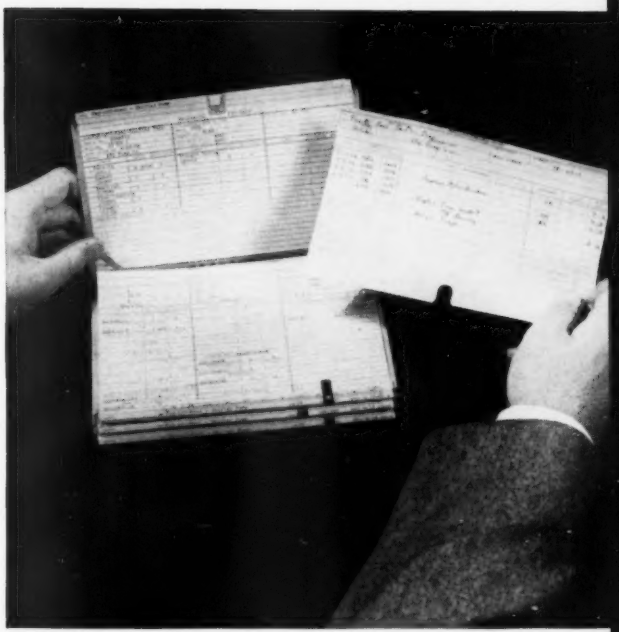
WORK OUT YOUR INSPECTION CYCLE. Consider the duty and application of all equipment. Then strike an inspection balance between "too often," with resultant waste of money, and "not often enough," with the possible damaging equipment outages that occur. The repair record will tell if more attention is needed. Ask your maintenance men to note on their check lists or report forms whether the frequency of inspection can be increased or decreased.

DEVELOP A WORK ORDER PROGRAM for routine maintenance work. Although there is no such thing as a universal work order (each plant must develop its own) certain essential information should be included on each. The work order ought to include a job number, job location, department number for charging purposes, the craftsmen required, the date required for completion, a description of the work to be done, an estimated and actual cost for labor and materials, and approval spaces.

GET RENEWAL PARTS RECOMMENDATIONS. Have your electric equipment manufacturer study the equipment recorded in your file. He will recommend the type and quantity of renewal parts you should stock. List these parts on the record card so the responsible maintenance man can determine immediately what parts are authorized for stock, and can identify these parts by number.

SET UP AN INVENTORY CONTROL SYSTEM. Estimate the approximate turnover rate for each part, procurement time, and the cost of acquisition to determine the minimum stock level to act as a reorder signal. To prevent duplication of identical parts sold under different numbers by different suppliers, cross-reference the parts numbers, and maintain the stock under only one number.

PURCHASE PARTS FROM ORIGINAL SUPPLIER—it's the best practice. The original supplier will have a greater interest and responsibility in the equipment operation. Parts will be the same dimensions, will have the same or better quality, and will be constructed to take advantage of recent engineering advances.

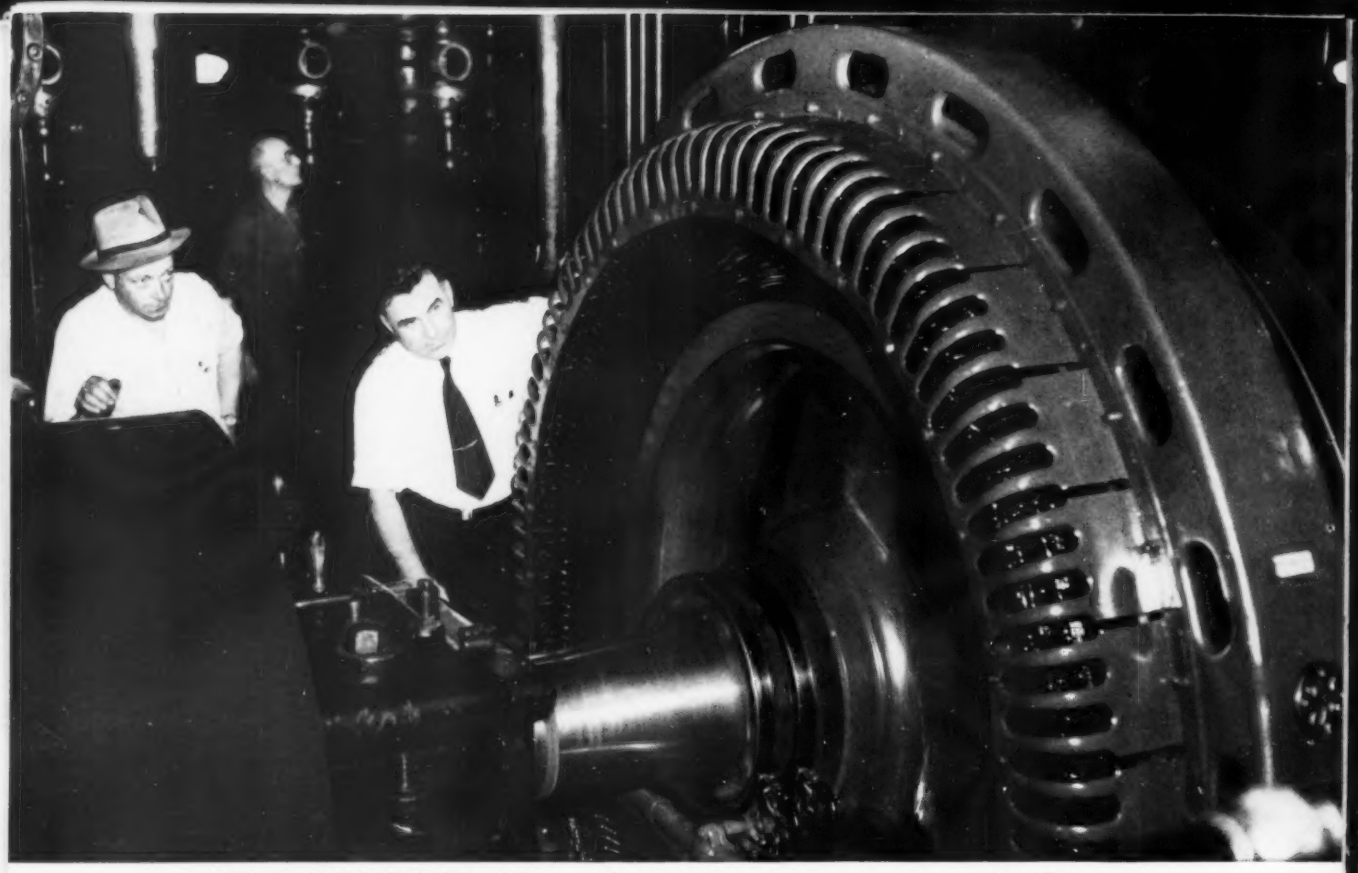


THE HEART OF ROUTINE MAINTENANCE is the keeping of proper, up-to-date records and paper work.

THE RECORD OF LOST TIME will tell you if inspection is balanced between "too often" and "not often enough."

GENERAL ELECTRIC

TURN PAGE FOR STEP 4



YOUR EQUIPMENT SUPPLIER will help you determine the condition of units on your critical list.

G.E.'s *Productive Maintenance* Plan

STEP 4 Evaluate for critical maintenance

List all equipment vital to production and inspect it thoroughly. Then, determine the critical-parts protection you need for each key machine

Close co-operation between Production and Maintenance Departments is necessary to determine what electrical equipment is vital to production. Together, these two groups must evaluate the functional importance and duty cycle of all electrical equipment included in your *Productive* Maintenance program.

WHEN IS EQUIPMENT CRITICAL? When its failure directly or indirectly interrupts or delays production. This is appraised by such things as high percentage of utilization, or lack of bypass equipment. Set up this list of equipment in order of importance.

INSPECT ALL EQUIPMENT on this critical list. Your equipment supplier, who has wide experience with his equipment under every type of operating condition, can help you determine the condition of critical units. Consider such things as age, duty-cycle, surges, and overloading. Based on this inspection, make a list of equipment on which the probability of breakdown is high. You will need this information to set up a planned overhaul schedule as discussed in Step 5.

HOW MUCH PROTECTION do you need for each key piece of equipment? The following steps will help you arrive at an answer to this question:

1. Calculate repair time under the following conditions assuming major failure:
   a. No critical parts stocked
   b. Some critical parts stocked (such as coils)
   c. All critical parts stocked (such as complete armature)
   d. Complete unit stocked
2. Determine cost of repair and inventory for each of the possible conditions.
3. Total this information to determine the total "failure cost."
4. Analyze total cost for each condition to determine what you must stock to protect the equipment.

The sample analysis chart at right shows you the factors involved in determining the best degree of protection at the lowest cost for each piece of critical equipment on your list.

Here is an example of how a *Productive Maintenance* analysis determined the best over-all protection for one specific motor doing one specific job:

EVALUATION OF CRITICAL PARTS PROTECTION REQUIREMENTS

(The evaluation is based on the failure of a part which requires the longest repair time, such as armature coils)

	NO CRITICAL PARTS STOCKED	ARMATURE COILS STOCKED	COMPLETE ARMATURE STOCKED	COMPLETE MOTOR STOCKED
REPAIR TIME	10 days to make coils X	6 days to rewind armature X	7 hours to install new armature	3 hours to replace motor
TOTAL DOWNTIME COST	$168,000	$100,800	$4,900	$2,100
COST OF PARTS PROTECTION	0	Coils: $4,664	Armature: $25,600	Motor: $46,000
COST OF REPAIR	$12,730	$5,900	Installation: $850	Installation: $360
TOTAL FAILURE COST	$180,730	$111,364	$31,350*	$48,460*

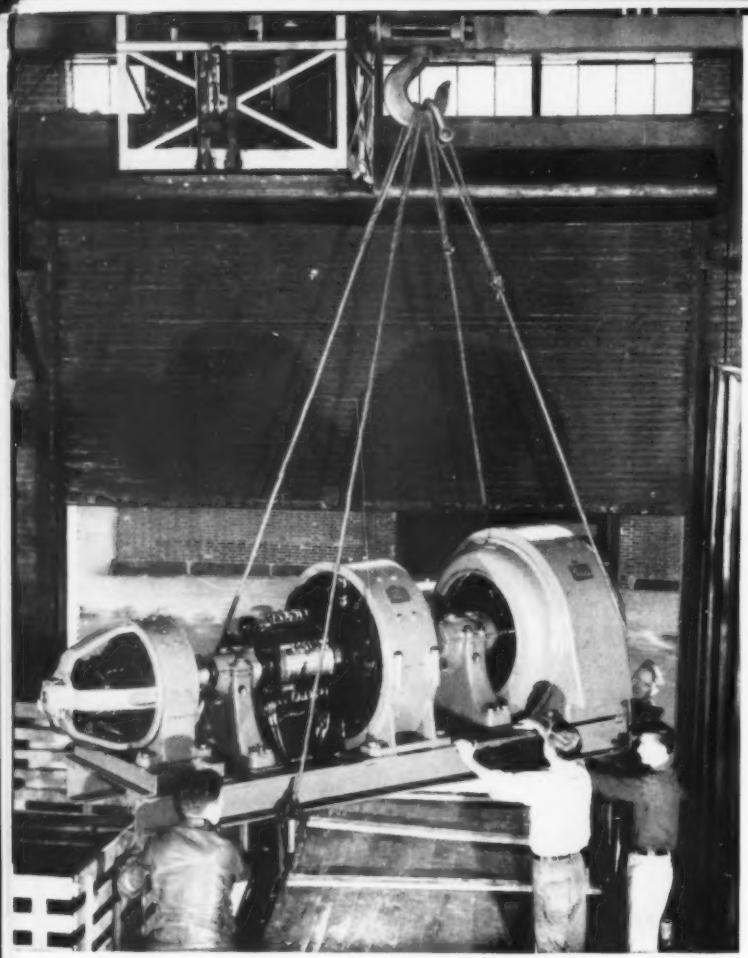
X Add disassembly, assembly and transportation time to actual repair time.

* Add repair cost, on straight time basis, of failed unit. This will be stocked for protection against future breakdown.

IN THIS PARTICULAR CASE HISTORY, the motor involved was a 500-hp slow-speed d-c motor on a machine critical to production at a large western paper mill. The problem was to determine how much an armature failure would cost. Downtime was estimated at $700 per hour. A G-E Maintenance Specialist helped the customer decide to stock a complete armature for best protection.

GENERAL ELECTRIC

TURN PAGE FOR STEP 5



PLANNED OVERHAUL, scheduled in advance, cuts outage time, reduces repair costs.

A CRITICAL MACHINE, like this motor-generator set, should have a rigid time schedule for servicing.

G.E.'s *Productive Maintenance* Plan

STEP 5 Establish a critical maintenance program

Minimize downtime costs two ways: by stocking critical parts, and by scheduling overhaul well ahead.

In Step 4, you determined the right degree of protection for each piece of critical equipment. Now take the action step—set up your critical maintenance program.

WHICH PARTS ARE MOST IMPORTANT? Get them *first*. Then organize your budget so that you can purchase the rest of your critical stock on a planned basis. Remember, too, that your critical equipment demands a more rigid schedule of inspection and service. Maintenance schedules must be more complete, and you must keep closer records of all operations, failures, maintenance and operating costs.

SCHEDULE PLANNED OVERHAUL of equipment inspected and listed in Step 4 on which probability of breakdown is high. Consider the difference in cost between planned overhaul and outage. Planned overhaul is effective after equipment has operated over a reasonable service life. You use it to remove from operation, on a systematic basis, the equipment that needs overhaul. You make this equipment available for inspection and complete rewinding, rebuilding, or modernizing at times most favorable to production. Result: the gap between actual and theoretical maximum production on the part of a machine is narrowed.

SCHEDULE PLANNED OVERHAUL WELL AHEAD, so all the necessary men, tools, and material for the work can be made available at the proper time both in your plant and in the repair shop. Overhaul can be set for normal downtime, vacation closing, holiday shutdowns, or for off-season production periods. Your objective should be to disturb production as little as possible.

PROBABLE RETIREMENT OR REPLACEMENT of every piece of critical equipment should be considered in this step. This means production requirements must be

ORGANIZE YOUR BUDGET to purchase the most important critical parts first.

projected into future years. If the anticipated usage of the equipment is only for a short period, it may be economical to assume the risk of operating over that period without planned overhaul, and depend entirely on inspection and routine maintenance.

HOW ABOUT AN OVERHAUL "PACKAGE"? There will be cases where you can schedule overhaul of dependent or secondary equipment at the same time as your major apparatus. In other words, for minimum downtime, overhaul should not be thought of by *machine,* but rather by *manufacturing operation.*

Setting up a Productive Maintenance program is a big job. None of the steps is simple. But by carrying them out, you will show a steady increase in the efficiency of your maintenance program. You will be able to prove that Productive Maintenance is one of the most important and productive functions in your plant's operation.

GENERAL ELECTRIC WILL HELP YOU SET UP YOUR PROGRAM

GENERAL ELECTRIC

THE PROBABLE RETIREMENT of a critical piece of equipment must be considered when setting up overhaul schedules.

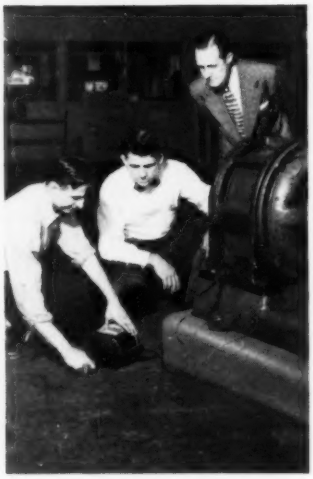
HERE'S HOW G.E. CAN HELP

How G.E. can help you set-up your *Productive Maintenance* Program

Your G-E Apparatus Service Shop representative is a Maintenance Specialist. He will work with you to simplify the job of setting up a *Productive* Maintenance Program in your plant. Call him in for help in the five areas listed below.

YOUR G-E MAINTENANCE SPECIALIST will supply complete parts data . . .

. . . guide you in planning routine inspection, routine maintenance and parts inventories . . .



. . . help you determine condition of all critical equipment and help schedule planned overhaul . . .

. . . help analyze critical equipment for best protection of each machine.

1—SUPPLYING COMPLETE PARTS DATA. Ask your G-E Maintenance Specialist to supply you with the identification of the various renewal parts in each piece of electrical equipment. Your basic records won't be complete without this information.

2—PLANNING ROUTINE INSPECTION AND MAINTENANCE. He can help you organize inspection trips and routine maintenance work by looking over your system, estimating how often equipment will need attention, and offering guidance on the best means of upkeep.

3—ESTABLISHING ROUTINE RENEWAL PARTS INVENTORY. Your G-E Maintenance Specialist can tailor a renewal parts program for your plant and guide you in establishing your parts inventory system.

4—ANALYZING CRITICAL EQUIPMENT FOR BEST PROTECTION. Ask your G-E Specialist to tell you just how long critical equipment repairs will take and how much each job will cost. He'll be glad to help you determine the best protection for each piece of vital equipment.

5—DETERMINING CONDITION OF CRITICAL EQUIPMENT. Your G-E Maintenance Specialist can help you assess the condition of all critical electrical equipment. And he can schedule men and machines at the G-E Service Shop to help you during planned overhauls.

FOR DETAILED INFORMATION:

General Electric Company
Apparatus Sales Division, Section A801-14
Schenectady 5, New York

☐ Please send me the detailed manual (GEA-6087) on setting up a Productive Maintenance Program in my plant.

☐ Please have a Maintenance Specialist from my nearest G-E Service Shop call on me.

NAME .....

POSITION .....

COMPANY .....

CITY ..... **STATE** .....

Productive Maintenance —as vital as production itself!

GENERAL ELECTRIC

Trim costs with this hook-up for valve-killing corrosive services

Stainless Steel PLUS Jenkins Quality

To end high valve mortality from most corrosive liquids, and to control fluids that must be kept free from contamination or discoloration, stainless steel is the right metal. But it takes more than metal to make a valve. For dependable performance, you need the two-way hookup — Stainless Steel *and* Jenkins time-proved Valve Engineering.

With the increased demand for processing equipment that resists corrosion, more and more Stainless Steel Valves have been added to the Jenkins line. It now includes types, designs, sizes and alloys to meet practically all industrial needs.

Let the famous Diamond trade-mark be your guide when you choose valves of stainless steel. As on *any* Jenkins Valve, it means *extra value* . . . longer, trouble-free service life.

NEW BOOKLET describes the wide range of types, sizes, pressures, and alloys available in Jenkins Stainless Steel Valves, with diagrams and dimensions. Includes description of alloys, helpful information on selection, and survey forms. Ask for Form 200. Jenkins Bros., 100 Park Ave., New York 17.

JENKINS VALVES

LOOK FOR THE JENKINS DIAMOND

SINCE 1864 TRADE JENKINS MARK

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SOLD THROUGH LEADING INDUSTRIAL DISTRIBUTORS EVERYWHERE

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You can Save Money, Cut Costs

See where B&D Hammers can save YOU Time and Money

	BREAKING concrete, stone, earth, chemicals	CAULKING joints in concrete, planking	CHANNELING for pipes, conduit, wiring	CHIPPING castings, rust, welds	CHISELING castings, welds, scale, rust	CUTTING web in concrete, tree roots	DEMOLITION of concrete, brickwork, masonry	DRILLING for lag bolts, anchors, shields	DRIVING shields, pins, spikes	GOUGING timbers, bevels, rotten wood	PEENING weld beads, rivets, clips	POINTING brickwork, all masonry	SCUFFING concrete surfaces to reface	SHAPING timbers, shavers, rough wood	VIBRATING concrete forms, mixes, feeds
WHEREVER THINGS ARE GOING UP:															
AIR CONDITIONING	●					●		●							
APPLIANCE INSTALLATION			●					●							
AWNINGS & TENTS								●	●						
HEATING	●		●			●		●							
HEAVY CONSTRUCTION	●	●	●	●		●	●	●	●	●			●	●	●
LIGHT CONSTRUCTION	●	●	●			●		●		●			●	●	●
ORNAMENTAL IRON				●				●	●						
PLUMBING	●		●			●		●	●						
ROOFING								●			●	●			
SEATING								●	●						
SIGNS & DISPLAYS								●	●						
WIRING	●		●					●	●						
WHEREVER THINGS ARE BEING MADE:															
BOAT YARDS		●			●				●		●				
CHEMICAL PLANTS	●			●		●		●							
FOUNDRIES				●	●										
MINES & QUARRIES	●						●	●	●					●	
PROCESSING PLANTS								●					●	●	
WELDING				●	●										
WHEREVER THINGS ARE BEING FIXED:															
FACTORIES—ALL TYPES	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PEST CONTROL	●					●		●					●		
RAILROADS	●			●	●	●	●	●	●	●		●	●	●	●
SHIPYARDS	●	●		●	●			●		●				●	
UTILITIES	●	●	●	●	●	●	●	●	●	●			●	●	●

FOR DRILLING, or for piercing masonry, in modernizing plumbing, rewiring buildings, lag-bolting machinery.

FOR CHANNELING, or slotting concrete floor, for placing electric conduit, laying oil-burner feed lines, concealing piping.

FOR SCALING, chipping off rust, edging castings, breaking off stucco quickly, easily and effectively.

FOR SMASHING, breaking up masonry, battering down old walls, smashing through concrete.

with a Black & Decker Hammer

Black & Decker Hammers have hundreds of time-and-money-saving uses, piercing concrete to install machines and power lines, as here, or *wherever* impact is called for.

New Book shows how!

Get this great book! Page after page of on-the-job photos show you how you can save time on dozens of different jobs! Scores of unusual tool-in-use photos suggest many new ways you can cut costs on your own operations! Dozens of money-saving ideas for you to put right to work on your own jobs! Get all the facts on many, many savings with Black & Decker Hammers — made for you by the World's Largest Manufacturer of Portable Electric Tools! A 3c stamp today may save you hundreds of dollars this coming year!

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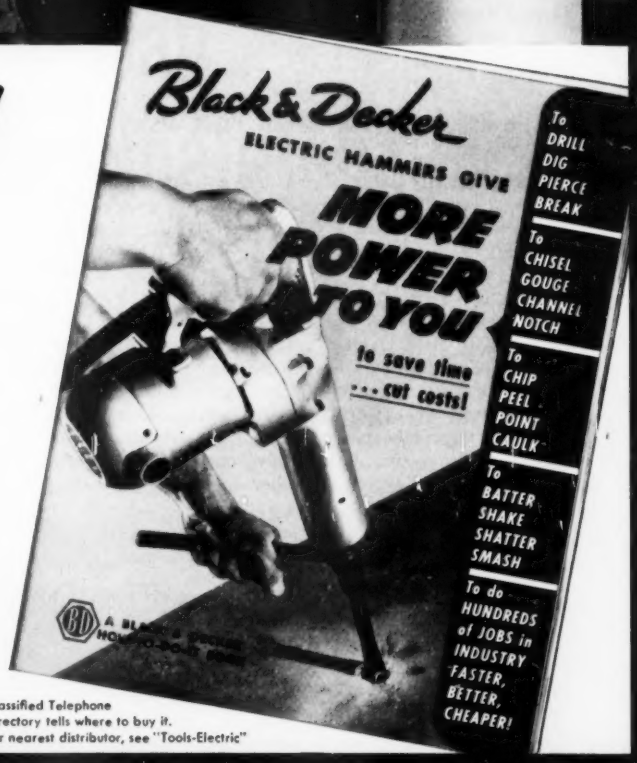
PORTABLE ELECTRIC TOOLS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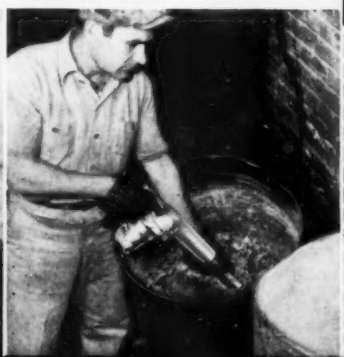
ELECTRIC HAMMERS GIVE
MORE POWER TO YOU
to save time
...cut costs!
To DRILL DIG PIERCE BREAK
To CHISEL GOUGE CHANNEL NOTCH
To CHIP PEEL POINT CAULK
To BATTER SHAKE SHATTER SMASH
To do HUNDREDS of JOBS in INDUSTRY FASTER, BETTER, CHEAPER!

Classified Telephone Directory tells where to buy it. For nearest distributor, see "Tools-Electric"

FOR CHISELING cracked castings for clean welding—a snap with a Black & Decker Portable Electric Hammer.

FOR BREAKING solidified materials in vats, tanks, etc.; shaking down wet sand; digging hard frozen earth.



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Dept. 611, Towson 4, Maryland

Please send me FREE copy of "More Power To You."

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Company.....

Address.....

City..... Zone..... State.....

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PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by M. E. Weissman

Steel Cone Puts the Heat On

A CENTRAL RERADIATING cone is the heart of an industrial furnace designed and manufactured by the Petro-Chem Development Company of New York. The cone is located in the upper end of the combustion chamber and serves the dual purpose of effecting an even distribution of heat and of increasing temperatures in the upper section of the furnace. Dangers of overload breakdown, air leakage, explosion and spotty heat distribution have been eliminated.

Basically, the furnace is a vertical steel structure with an integral self-supporting stack. The inside of the cylindrical casing, which is insulated with rock wool and refractory brick, forms the combustion chamber.

The medium to be heated is passed through a circle of vertical tubes adjacent to the cylinder walls and equidistant from the flame burst of burners in the furnace floor.

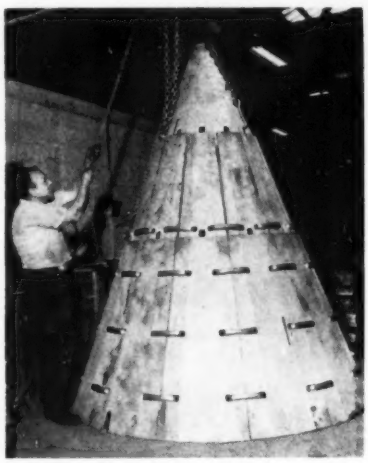
All tubes are supported at floor level and are guided at the top by removable segmental tube sheets. Each part of the furnace structure is free to expand vertically and circumferentially regardless of temperature differences in various sections.

Directional burners in the furnace are set for a uniform rate of heat transfer throughout the length of each heating element either by regulating the quantity of oil or gas flowing to the burner, or by making a simple adjustment to the angle of firing.

Uniform radiant heat transfer rates are obtained by bathing the heating surfaces nearest the flame burst with a controlled amount of radiant heat, while the upper sections of the heating surface are subjected to varying proportions of direct radiant and secondary radiant energies.

Material specifications for the reradiating cone include castings in a chromium-nickel alloy capable of withstanding direct furnace temperatures of 1800 F. Sectional construction of the furnace enables it to be broken down into easily managed units.

From C A Newscast, published by Cooper Alloy Foundry Co., Hillside, New Jersey.



Giant steel alloy cone reradiates heat in prefabricated industrial furnace

Little Red Fire Truck Travels Plant Aisles

SMALL ENOUGH to be driven along a plant aisle, powerful enough to throw a jet of water or fog 70 ft, our latest model fire truck, at Plant No. 3, is equipped to fight any type of fire in an enclosed area.

It is custom built, measures 150 in. long and 48 in. wide, and has a capacity of 300 gal of water.

Water or fog can be selected by means of the trigger nozzle on each of the two 150-ft long hoses. They can be used simultaneously with either type of spray, or, alternatively, one hose can shoot water, the other fog.

A pressure of 800 psi is developed by the three-piston pump on the truck, with a pressure of approximately 650 psi at the hose nozzle.

Other equipment on the truck, which incorporates many ideas of plant Fire Chief Jerry Barnes, includes a siren, red lights, flood lights and standing room for one or two passengers in the front of the truck. A step and grab bar at the rear can transport two to three more firemen.

From AllisonNews, published by Allison Division of General Motors Corporation, Indianapolis, Indiana.

Fire truck is put through its paces by firemen and members of volunteer crew

Snap-Action Switch Cuts Metal

BEFORE A SNAP-ACTION limit switch was installed on a combination roller-leveling and cut-to-length machine assembly at the Eastern Brass and Copper Company, Inc., two men were needed to run it.

Coiled metal stock was fed into the machine automatically, but as the flattened metal came out of it, an operator had to hand feed the metal into the cutting component.

The second operator, who unloaded the cut pieces, would signal when the stock reached the desired length. The first operator would then activate the shear with a foot switch.

With use of a limit switch one man is able to control the entire operation. The switch which operates the cutter is set for the correct length of metal and the machine runs continuously. As the flattened stock strikes the switch

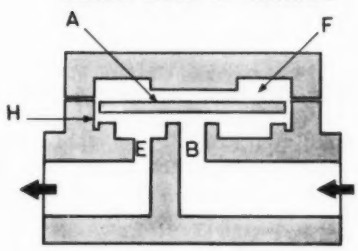
SARCO
Thermodynamic
STEAM TRAP

ACTUAL SIZE

this new trap virtually eliminates maintenance

SOLID STAINLESS STEEL DISC ACTS AS VALVE HEAD

HERE'S HOW IT WORKS!



Air and/or condensate raise valve seat disc A, discharge thru E. When steam follows, greater velocity causes it to strike body at H thus building up pressure in chamber F. This causes disc to seat, closing tube B. As pressure in F decreases by condensation, pressure in tube B raises disc and cycle is repeated.

The Sarco Thermodynamic Trap has proved successful on steam mains and separators; headers and soot blower pipes; engine and turbine stop valves, separators and casing drains; alternate heating and cooling applications.

2098-B

A solid stainless steel disc—practically indestructible—is the only moving part!

Most striking feature of the Sarco *Thermodynamic* Trap is its simple maintenance-free design. There's only one moving part—a solid stainless steel disc that practically lasts forever. There are no other moving parts to wear out or cause trouble.

Condensate, air and steam act directly on the disc valve which opens to discharge condensate and air—snaps shut to contain steam. There are no mechanical devices required to operate valve (see diagram at left). That means practically endless trouble-free operation.

Other advantages: small size, easy installation, not affected by shock or vibration, immunity to corrosive elements with all wearing parts stainless steel, same valve head and seat for all pressures to 600 psi and temperatures to 950° F.

Check these advantages to your own satisfaction at absolutely no cost. We'll send you a trap for trial. All you do is fill out the coupon and mail it in.

SARCO COMPANY, Inc.
Empire State Building, New York 1, N.Y.

MAIL COUPON TODAY FOR TRIAL

Sarco Company, Inc., Empire State Bldg., New York 1, N.Y.

Gentlemen: Please send me a Sarco Thermodynamic Trap for a 60-day trial, requirements as checked.

Size: ½"... ¾"... 1"... Operating Pressure:.....psi

For installation on.....

NAME_____

FIRM_____

ADDRESS_____

CITY_____ STATE_____

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PLANT ENGINEERS' DIGEST

(Digest begins on page 44)

the shear cuts the metal. The operator's only function now is to unload the cut pieces into a shipping cradle.

Work has been speeded by use of the limit switch by 10 to 15 per cent. *From Micro Tips, published by Micro Switch Div., Minneapolis-Honeywell Regulator Co., Freeport, Illinois.*

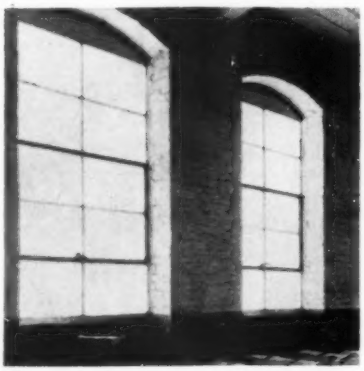
Glazing with Plastic

COST OF REPLACING broken window panes at the Philadelphia plant of Keystone Refining Co., has been eliminated since the installation, two years ago, of white, translucent, Plexiglas glazing. Previously the company had a yearly replacement bill of about $400.

Because of the light-diffusing properties of the acrylic plastic, work areas are well lighted, even on dark and cloudy days. The need for electric lighting, and its attendant costs, has been dispensed with. Breakage resistance of the plastic is a safety factor as well as a money saver.

When the changeover from glass to plastic glazing was made, part of each window opening was bricked in to gain much needed wall space between floor and window sill. At the same time, the amount of effective daylight inside the plant was increased, and sky glare reduced to a minimum.

Basement windows formerly boarded up because of continual breakage, have been bricked in except for a small area in each window which has been



Acrylic plastic glazing means improved light diffusion and service, less upkeep

glazed with plastic. This results in a better lighted basement and improved appearance in the building. *From a release of Rohm & Haas Company, Philadelphia Pa.*

Preventing Propane Explosion

BEFORE REPAIRS or changes are made in a propane distribution system, all possible contingencies which could result in the release of propane should be anticipated and the necessary protective measures taken to prevent accidental release of this fuel. Because adequate precautions were not taken at a midwestern metal works, an explosion resulted.

The maintenance department at this company was informed that the gas pressure was low in the propane distribution system. In checking the installation it was found that the gas-fired, low pressure boiler supplying steam to the propane vaporizer was not in operation. It was also noticed that the steam supply pipe between the boiler and the vaporizer was frozen and that the water level in the boiler was extremely high.

This latter condition was corrected and the boiler was started to allow the steam to melt ice in the system. It was then found that the entire steam section in the vaporizer was frozen.

The steam supply and condensate lines were disconnected, allowing the water to run out as the ice melted. Then the boiler section was checked and found to be satisfactory.

As the maintenance men returned to the vaporizer room, the vaporizer house section exploded. The men were knocked down but not badly injured. Gas from the ruptured propane lines immediately ignited but the flames subsided when the main propane valve was closed.

Evidence showed that the mercury switch on the boiler failed to stop the boiler water make-up pump. This allowed the water to fill the boiler and run along the steam line between the boiler and the vaporizer and to fill the vaporizer steam section where the water froze.

The frozen water caused a rupture within the vaporizer between the steam and propane sections, then during thawing, propane, under pressure, entered the steam section through this

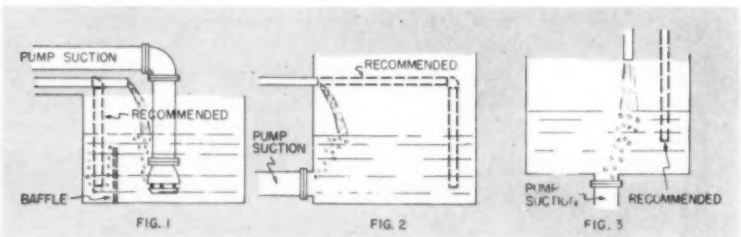
(Continued on page 48)

To Pump Liquids, Not Air, Check these Trouble-Makers in Pumping Operations

THE PRESENCE of a small quantity of air in the liquid passing through a pump designed to handle only liquid, can cause serious loss of efficiency. In addition to wasted power, the pump will be noisy with destructive vibration, may lose its prime, and be subject to greatly accelerated corrosion. Also, entrained air is a frequent cause of shaft breakage.

Air or vapors in the liquid may be due to leaky suction lines, improperly packed or sealed stuffing boxes, or free discharge of the liquid above its surface, at or near the pump suction.

Liquid falling directly on the foot valve, as in Fig. 1, would carry air into the suction line. This could result in the pump losing its prime.



Sketches above show some causes of air in pumped liquids and suggested remedies

In Fig. 2 the pump has flooded suction. While the depth of air penetration may appear to be negligible, water currents and vortices can draw a considerable amount of water into the pump. A suggested improvement is shown in the sketch.

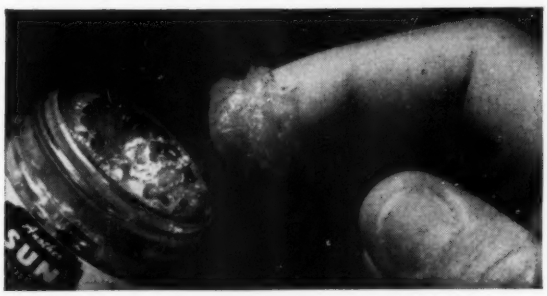
Free fall of liquid is serious, but a line discharging downward under pressure, see Fig. 3, can give even more serious trouble.

If the return liquid is heavily laden with air or the sump is small, baffles may be necessary to allow the air to separate before it enters the pump suction, as seen in Fig. 1.

Return lines should be extended far enough beyond the pump suction and below the surface of the liquid in order to minimize the amount of air or vapor entrained. *From Goulds News, published by Goulds Pumps, Inc., Seneca Falls, N. Y.*

THESE 3 SUN GREASES WILL DO 95% OF YOUR GREASE LUBRICATION JOBS

—save you the cost and trouble of stocking a large number of "special purpose" greases



FIBROUS • Sun Grease 844X

Has exceptional oxidation stability under high temperature conditions. Recommended for all antifriction bearings. A general-purpose, high melting point lubricant for pressure gun and grease cup application.

BUTTERY • Sun Grease 300A

Especially designed for pressure lubrication of bearings operated at normal speeds and temperatures. Can be used in pressure guns, compression grease cups, or pressure lubrication systems. Has high water resistance and excellent pumpability at low temperatures.

TACKY • Sun Grease 897

For open gears, chains, slides, cams, linkages and bearings. Used whenever "throw-off" must be avoided. High adhesive and cohesive characteristics. An excellent lubricant that is water resistant and does not need frequent application.

Of the 81 different Sun greases, these three can fill the vast majority of your needs. And lubrication simplification like this means worth-while economies for you in several directions. You can reduce the total amount of money you need to "invest" in lubricants. You can greatly lighten the housekeeping job of storing and handling your greases. And you can reduce the confusion and risk of error often created when personnel are required to choose from a large number of greases.

For lubrication points that do require special kinds, Sun offers a total of 78 other greases with a wide range of properties and characteristics.

Find out just how much you can economize by using Sun lubricants. Call in your Sun representative. Or write for information. Dept. PY-10.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO®

PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

Refiners of famous High-Test Blue Sunoco Gasoline

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PEAK TEMPERATURE AND PRESSURE EXTREMES

HOT
1000° ABOVE ZERO F.

Petro Unions conform to a recognized American dimensional standard (Association of American Railroads) better known as A.A.R. and will interchange with all other A.A.R. unions.
The ends and nut are octagon in shape. The ends are tapped to Briggs Standard steam threads.
PETRO A.A.R.
Nut threads are rust-proof, spark-proof, and permanently lubricated with Udylite Cadmium.
The seats are machined on fine precision production machines. The female seat is cold rolled with minimum differential in hardness of 40 points (Brinell) maintained between the male and female seats to safeguard against seizure or gauling on temperatures to a 1000° F.

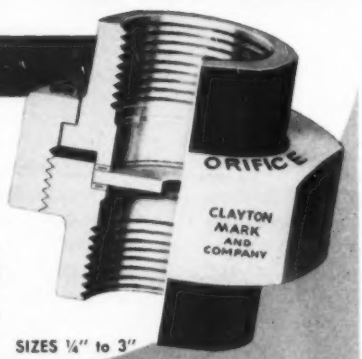
PETRO A.A.R.

SCREWED OR SOCKET-WELD

Petro unions will perform with perfect satisfaction on any type of service including ammonia refrigeration. Pressures to 900 pounds S.W.P. or to 3000 pounds C.W.P. The greatest value ever offered in a forged steel union.

COLD
100° BELOW ZERO F.

C. M. & CO. ORIFICE



For flow control of steam, oil, ammonia, chemicals, water, gas, air. Also for metering and measuring.

Recommended for working pressures of 600 lbs. at 850 degrees fahrenheit, or 3000 lbs. at 150 degrees fahrenheit.

Furnished with 18-8 stainless steel orifice plate and steel-jacketed asbestos filled gaskets.

Illustration shows the orifice plate and gaskets set in a groove of solid steel to facilitate ease of tightening and safeguarding against blowing of gaskets and resultant trouble.

Nut threads of the union are Udylited (cadmium plated) for permanent thread lubrication.

SIZES ¼" to 3"

ORDER BY TRADE NAME FROM YOUR LOCAL JOBBER

ORIGINATORS AND PIONEERS OF STEEL UNIONS SINCE 1912

CLAYTON MARK & COMPANY

1900 DEMPSTER STREET • EVANSTON, ILLINOIS

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PLANT ENGINEERS' DIGEST

(Digest begins on page 44)

opening and discharged into the room through the disconnected fittings on the vaporizer. *From Sentinel, published by Factory Insurance Association, Hartford, Conn.*

Lifting and Weighing — In One Operation

A LIFT TRUCK which weighs its load during transit to within 1 lb of the exact weight, is streamlining dock work at A. E. Smith Coggins Ltd., Liverpool, England. Handling loads on and off conventional weighing machines is now eliminated.

The truck has a capacity of 2,000 lb. Its delicate weighing mechanism is protected from damage during trips over rough surfaces by an automatic hydraulic locking equipment. *From Target, published by British Information Services, New York, New York.*

Dial in front of the driver records weight of load while truck is in transit

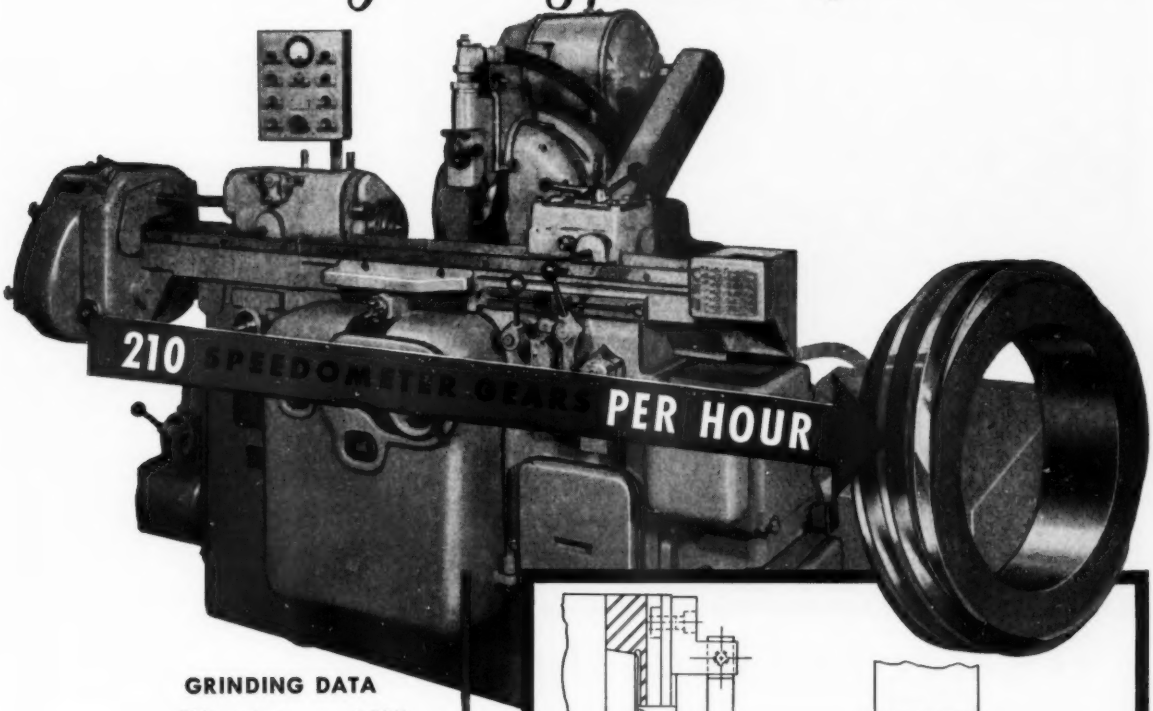
Beta Ray Gage Measures Paper

A BETA RAY GAGE is in use in our paper mill to give accurate and constant measurement of paper in the process of manufacture.

The ultra-sensitive measuring instrument installed on a 166-in. paper-making machine, has an element of Thallium as its radio-active isotope. The gage scans the width of the web at intervals of approximately four minutes, giving a continuous measurement both lengthwise and crosswise.

Measurement is made when a percentage of the electrons emitted by the isotope above the paper are reflected into a detector unit. These reflected

Multi-ribbed grinding BOOSTS production!

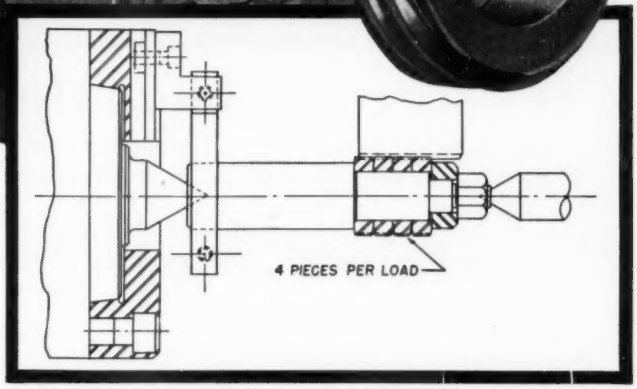


GRINDING DATA

Diameter . . . 1.93″
Pitch . . . Approx. 6
Form . . . Worm
Thread . . . 4-Start
Lead . . . .6797″
Helix Angle . . . 6° 37′
Thread Length . . . 1⅞″
One way grinding
Stock removed . . . .089″
Crush Dressing of Wheel

AUTOMATIC WORK CYCLE

Automatic In Feed
Automatic Sizing
Automatic Wheel Trueing
Automatic Lubrication
Automatic Coolant System



These four-start worms are ground — four at a time in a single pass — from the solid. A multi-ribbed wheel is crush-dressed every 48 pieces (twelve arbor loads). The finish on these parts — and the rate of production — exceed those possible by any other methods.

This is a typical example of how the FULLY AUTOMATIC WORK CYCLE of Jones & Lamson Automatic Grinders assures rapid metal removal, accuracy of form and quality of finish.

P.S. Because of today's challenge for increased production at a higher degree of accuracy, Automatic thread and Form Grinders are replacing other methods for producing this class of work.

On the basis of increased quality and *more production per labor hour*, we invite the opportunity to improve upon your existing methods.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 524 Clinton St., Dept. 710, Springfield, Vt., U.S.A. J&L MACHINE TOOL DIV.

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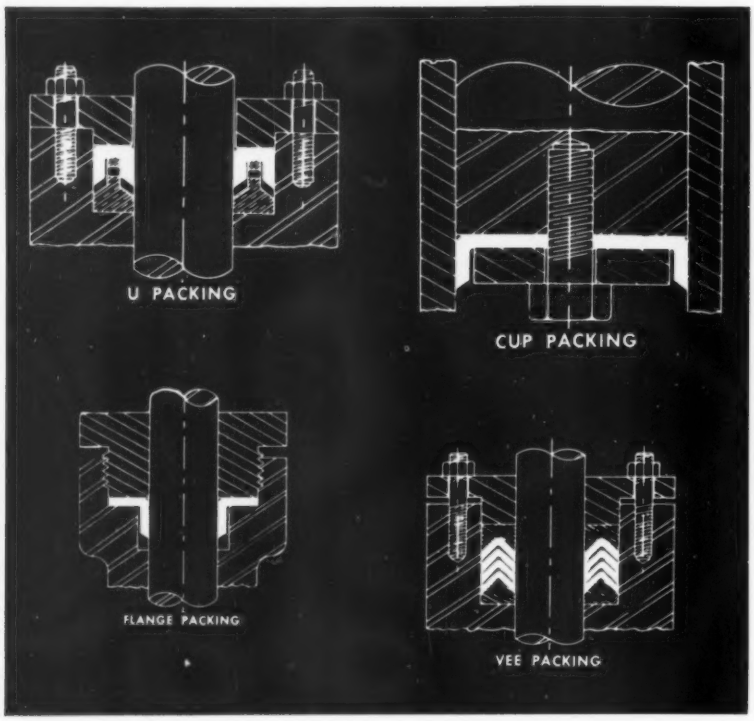

It's hard to beat these advantages of Tannate®

Leather Packings

1. They do not require lubrication
2. They do not readily coldflow
3. They will not score or abrade
4. They are adaptable to many different types of service
5. They can be stored indefinitely
6. They are not affected by sub-zero temperatures

You get all these special advantages from Tannate Leather Packings because they are tailor made from special tanned Tannate Leather, custom impregnated to meet your requirements.

If you have a special need for a packing that will seal better and last longer, specify Tannate Leather Packings.

RHOADS
INDUSTRIAL LEATHERS

PHILADELPHIA • NEW YORK • CHICAGO • ATLANTA

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PLANT ENGINEERS' DIGEST

(Digest begins on page 44)

Constant check on measurements is kept by beta ray on papermaking machine

radiations are then transmitted electronically to a recording device where they are transcribed on to a scale chart. The mechanism is set for a particular weight or thickness of paper so that a variation from these measurements will show up on the chart. This permits immediate adjustment of the machine, thus giving uniformity to the paper being manufactured.

For safety, the isotope is encased in a hermetically sealed container. A heavy, solenoid-operated shield automatically springs over the radiation exit when the gage is placed on "standby" or if power is completely cut off. Should the protective diaphragm covering the source container be punctured, an alarm is sounded automatically. *From a release of Champion-International Co., Lawrence, Mass.*

Elevator Overspeed Governors

VITAL IN THE SAFE operation of an elevator is its overspeed governor that will actuate the car safety device should the elevator exceed its prescribed speed downward by a certain percentage.

Ordinarily located at the top of the elevator shaft, the governor is driven by a continuous cable which travels over a sheave and which supports a tension weight unit at the lower end of the shaft. When the car travels at normal speed, the governor cable rides along with it. Should this speed be exceeded, the cable jams, stopping its motion.

With the governor cable stationary and the car traveling downward, a pulling force results on the safety device actuating member to which the cable is attached. This causes the

What's YOUR heating job?

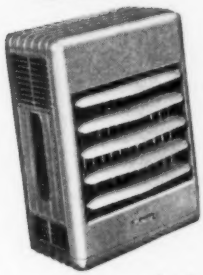
STEAM?

Modine builds 28 sizes of vertical delivery units—14 for standard and 14 for low outlet temperatures—with choice of four easily attached deflectors. There are also 19 horizontal and ten power throw models for standard and low outlet temperatures.

HOT WATER?

Vertical delivery units come in 14 sizes with a choice of 4 easily attached deflectors. Five horizontal models are designed specifically for hot water. Five power throw models are also available.

GAS?



Only Modine gas-fired unit heaters have stainless steel burners and a choice of stainless or aluminized steel heat exchangers. Seven sizes—25,000 to 220,000 Btu. A.G.A. and C.G.A. approved for natural, mixed, manufactured, LP and LP-air gases.

You name it— Modine has the unit heater to do it better . . . at lower cost

WHATEVER your unit heating needs, you can depend on Modine for maximum heating comfort at lowest possible fuel cost. For over 25 years, the Modine name has been synonymous with quality and advanced engineering.

Take steam and hot water unit heaters, for example. Discharge air temperatures of 110-120° F are correctly related to air velocity for heating at its best. There's minimum heat loss compared to some units that discharge air at such high temperatures that it immediately rises to the ceiling, or others with velocities so low that the heat reaches only a small area.

As for gas-fired unit heaters, Modines are only half the weight, half the size of other leading makes. You save installation costs, save on shipping charges. And this same advanced design means longer life, five-second heating response to thermostat's demand.

Yes, from every angle . . . for every job—you're way ahead when you specify Modine unit heaters. You'll find it pays to buy the greatest name in unit heating.

For facts on steam and hot water unit heaters, see the Modine representative listed in your classified phone book. Or write today for your copy of Catalog 154.

Get complete information on gas-fired unit heaters. Write for Bulletin 654 to Modine Manufacturing Company, 1563 DeKoven Avenue, Racine, Wisconsin.

U-1231

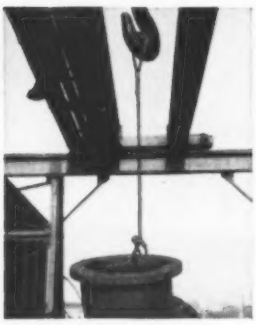
Modine UNIT HEATERS

For more facts circle 533 on Reply Card

ACCO Registered* Slings

It's Flexible—and It's ALL Steel CABLE-LAID SW-56

Single leg used in basket hitch around heavy rough casting



Another leg used in choker hitch through opening of cast elbow

Two legs used as whip slings for heavy unbalanced load

"It's the most useful sling we have ever had"

• This is what users say because ACCO Cable-Laid has the flexibility of manila rope but the strength of steel. It's made from improved plow steel wire for greatest known strength. Yes, even the independent wire rope core is made of the same tough wire.

The high flexibility of ACCO Cable-Laid comes from the construction of the rope. It's not just six strands around the core, it's six separate wire ropes laid around the wire rope core. This is also what gives ACCO Cable-Laid its fine resistance to kinking even after used around square corners.

Add to ACCO Cable-Laid the patented DUALOC ending—and the ACCO half-thimble—and you have a sling which can't be beat for all-around usefulness and low cost lifting. In addition to the inherent advantages of the ACCO Cable-Laid construction, these slings are ACCO *Registered* with all of the advantages this specification assures.

Get full details of the SW-56 ACCO Registered Cable-Laid and other ACCO Registered Wire Rope Slings from your nearby ACCO Registered distributor—or write us at Wilkes-Barre, Pa.

**Trade Mark Registered*

ACCO

TRADE MARK

Wire Rope Sling Department
AMERICAN CHAIN & CABLE

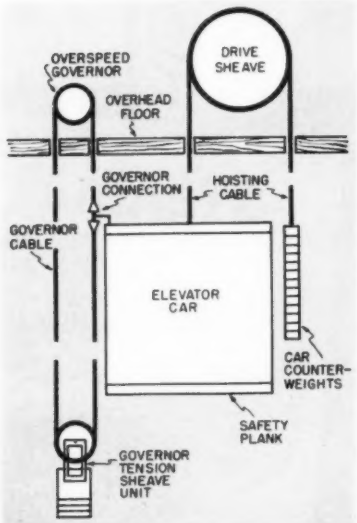
Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn. • In Canada: Dominion Chain Co., Ltd., Niagara Falls, Ont.

for Better Value

For more facts circle 534 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 44)



Sketch shows inter-relationship of governor, governor cable and safety device

steel wedges or rollers to be thrust against the main car rails, allowing it to be suspended on the rails without support from hoisting cables or counter weights.

Overspeed governors are subject to the same wear as other moving parts of the elevator, and when overhauled should be accurately recalibrated for the required tripping speed. *From Maintenance News, published by The Maintenance Company, Inc., New York, N. Y.*

Converted Air Compressor Strips Floor Wax

EVERY SO OFTEN, old wax on the floors of our general offices and service center has to be removed or "stripped" to make way for a new coating.

A cumbersome scrubbing machine, which did an indifferent job, was first used. An improvement on this method was the use of a three gallon, shoulder type garden spray tank. Filled with a chemical detergent it removed the old wax fairly well. The complete operation involved a half-mile trip for each of five separate filling operations, and more than 700 strokes on the hand pump.

For the past few months an improvement in the three gallon tank has been used to strip wax. Basic component of the latest model is a tank and compressor, originally intended

for use with air, not with a liquid.

There was no convenient opening for filling it with a fluid, but braze-welding of a filling top from a discarded soda-acid extinguisher solved the problem. The installation of several new fittings and controls on the tank and air compressor completed its conversion for use with a liquid.

The tank, which is mounted on wheels, requires only nine gallons of detergent to strip 4500 sq ft of wax, as opposed to the 15 gal required to clean 3600 sq ft with the old tank. It needs to be filled only once and travel for each trip has been cut down from a half mile to 360 ft. *From Union Electric News, published by Union Electric Co. of Missouri, St. Louis, Mo.*

Wax stripping machine is air compressor converted for use with liquid detergent

Coal-Driven Power Stations

THE RECENT DISCOVERY of coal (black, fossilized plant remains) in a number of places offers an interesting alternative to the production of power from fission. Some of the places where coal has been found show, indeed, signs of previous exploitation by prehistoric men who, however, probably used it for jewels and to blacken their faces at religious ceremonies.

Power potentialities depend on the fact that coal can be readily oxidized with the production of a high temperature and an energy of about 0.0000001 megawatt day per gram.

Chief advantage is that the critical amount is very much smaller for coal than for any fissile material. Fission plants become, as is well known, uneconomical below 50 megawatts, and a coal-driven plant may be competitive for isolated communities with small power requirements.

Main problem is to achieve free, yet controlled, access of oxygen to the fuel elements. The kinetics of the coal-oxygen reaction are much more complicated than fission kinetics, and not yet completely understood. A

(Continued on page 200)

ACCO Registered* SLING CHAINS

You get more than chain when you buy ACCO Registered Sling Chains

• This 125,000 psi ACCO *Registered* alloy sling chain has great strength, yet it's lightweight and easy for men to handle. It will lift a variety of expensive loads safely over costly machines. You can be sure of that because it's ACCO *Registered*.

ACCO *Registered* is more than a name. It's more than a registered trade mark of American Chain & Cable. It is the standard by which all other slings are judged. It means that you can equip your shop with dependable "lifting tools" specifically designed for highest efficiency and long life by trained engineers who spend all their time designing and testing slings.

A survey of your sling requirements will cost you nothing. See your ACCO *Registered* Sling Chain distributor today or write our York, Pa., office for details. *Trade Mark Registered

WHAT "ACCO REGISTERED" MEANS . . .

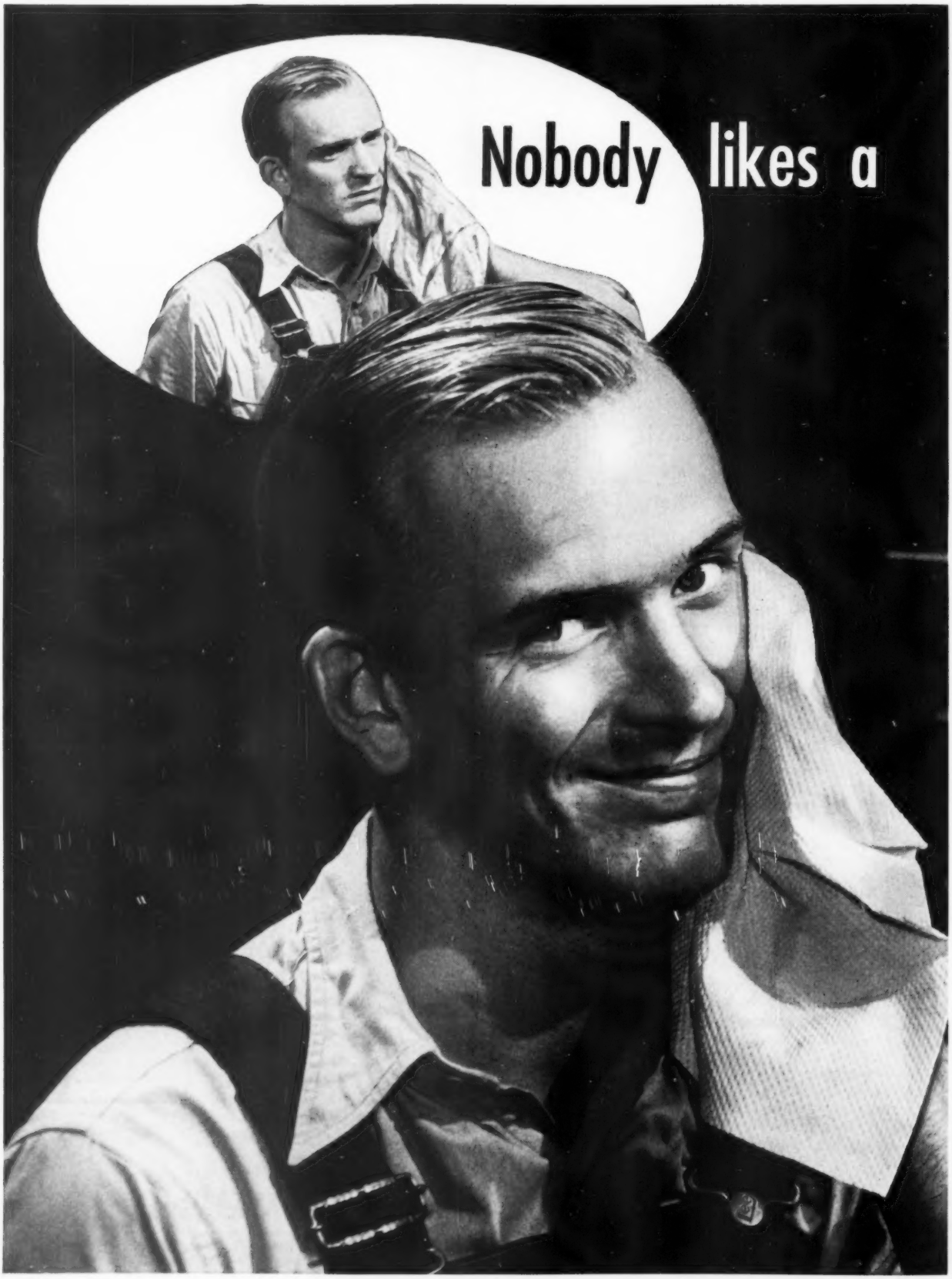
1 The best material
2 Unit safety factor (on bodies, rings, links, hooks)
3 Proof test of complete sling to twice the working load limit
4 Actual field service test of each design
5 Metal identification ring on each sling
6 Signed Registry Certificate with each sling

ACCO
TRADE MARK

American Chain Division
AMERICAN CHAIN & CABLE

York, Pa., Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

For more facts circle 535 on Reply Card


Nobody likes a

dirty wiper

...Another good reason for switching to **Scott Wipers!**

Because a clean, fresh one is always available—Scott Wipers provide a constant source of clean chip-free wiping material.

Scott Wipers are sanitary and disposable. They greatly reduce the costly scratches and digs in finished work caused by chips lodged in wiping materials. They end the laundering problem and simplify distribution and control.

Scott Industrial Wipers are two-ply and tough yet soft and absorbent. Compare them with whatever wiping material you're using now —for cost, for convenience, for performance.

The Scott representative or distributor in your area will be glad to help you set up a production line demonstration in your plant. Call him or mail this coupon today.

Scott Paper Company, Dept. PE-1, Chester, Pa.
Please send me full information on Scott Industrial Wipers.

Name_____

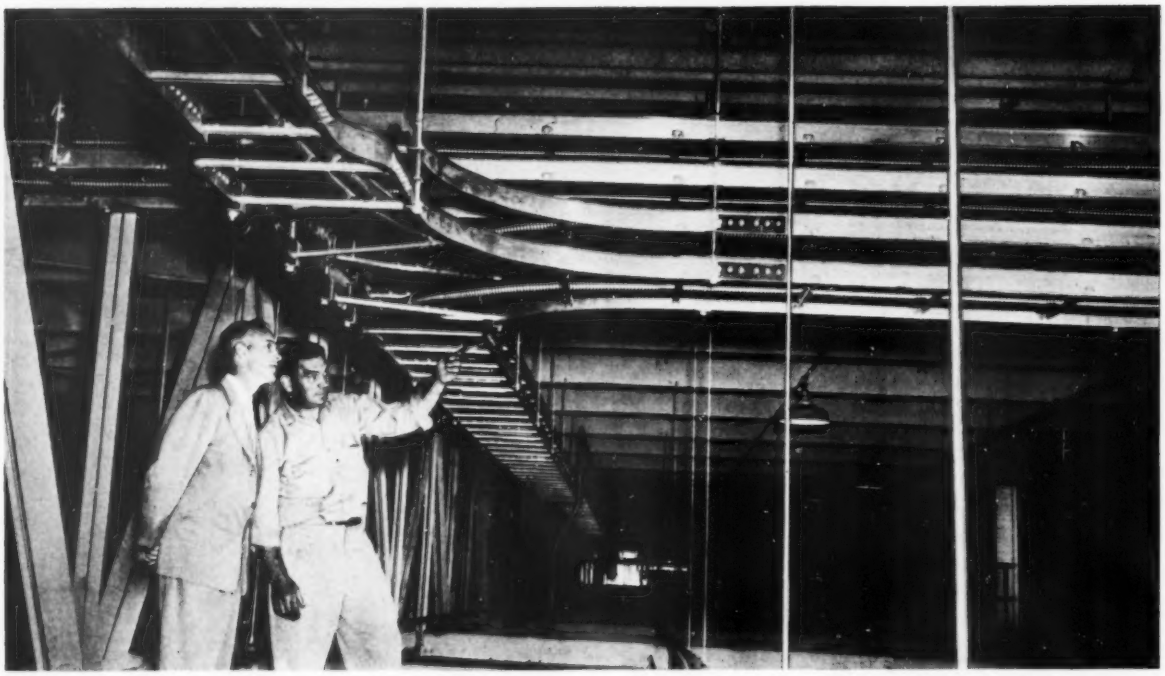
Position_____

Company_____

Address_____

City_____ State_____

For more facts circle 536 on Reply Card



Part of the General Electric V-c interlocked armor cable secondary feeder system in the Painesville, Ohio, plant of Industrial Rayon Corporation. Each cable is individually protected and individually accessible.

V-C INTERLOCKED ARMOR CABLE SYSTEM CUTS COSTS, INCREASES CIRCUIT RELIABILITY

INSTALLED COST SAVINGS

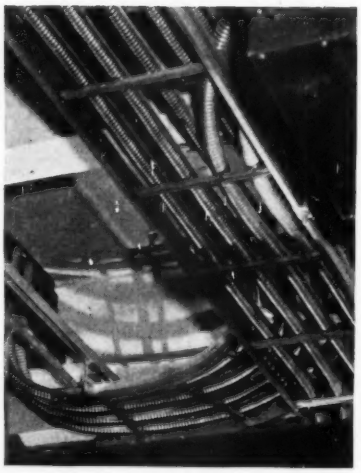
Many industrial concerns are taking advantage of the economies of a G-E V-c interlocked armor cable system. Industrial Rayon Corp., for instance, found that a G-E cable system was by far the most economical means of secondary distribution. Costs were low because the flexible interlocked armor cable could be installed fast — indoors or outdoors, around corners, over beams, and in long runs. The cable was installed on low-cost aluminum racks hung from the ceiling, and spliced with simple mechanical joints. As a result, both engineering time and installation time were cut.

INCREASED RELIABILITY

Circuit reliability is increased because each cable is individually protected, and is less apt to be affected by any fault that may occur in another circuit.

FOR NEW PLANTS OR OLD

Whether you're planning a wiring system for a new plant or modernizing an existing system, G-E varnished-cambric interlocked armor cable offers you reliable service with savings in both time and cost. Consult your G-E cable specialist, or write Section W149-1064, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.



The cable bends easily. Corners and projections present no installation problem.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 537 on Reply Card

High Efficiency Deaeration at LOW COST for Small and Medium Size Power Plants

Cochrane

*UNI-PAC DEAERATOR

- FACTORY ASSEMBLED
- COMPLETELY SELF-CONTAINED
- EASY TO INSTALL
- MINIMUM PIPING REQUIRED
- WIDE RANGE OF HEATER SECTIONS, STORAGE TANK AND ACCESSORIES TO MEET ANY PLANT REQUIREMENT
- GUARANTEED ZERO OXYGEN

COCHRANE CORPORATION — WATER ENGINEERS FOR 91 YEARS — 1863 - 1954

Here's the deaerator every small and medium-size plant has been waiting for!

Now for the first time you can get a ready-to-install deaerator that will give you high quality boiler feedwater at extremely low cost. The UNI-PAC DEAERATOR is guaranteed to deliver water with an oxygen content not to exceed 0.005 c.c. per litre (less than 7 p.p. billion)—generally recognized as zero oxygen!

*Trademark

The UNI-PAC DEAERATOR is designed for both right and left hand installation, and in a wide range of outlet and storage capacities. Accessory equipment is available to meet the conditions of operations peculiar to the plant and to obtain the results desired.

Publication 4643 contains complete details. Write today for your copy.

C100.2

COCHRANE CORPORATION
3126 N. 17th STREET, PHILADELPHIA 32, PA.

Please send me a copy of your Publication 4643 on the Cochrane UNI-PAC Deaerator.

Name_____ Title_____

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Address_____

City_____ Zone____ State_____

Cochrane

CORPORATION

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In Puerto Rico: F. A. Ortiz & Co., San Juan 5
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In Canada: Canadian General Electric Co., Ltd., Toronto
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In Europe: Recuperation Thermique & Epuration, Paris
In Cuba: Laurence E. Daniel, Inc., Havana
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Hot Process Softeners | Deaerators | Dealkalizers | Demineralizers | Reactors | Continuous Blow-Off | Specialties | C-B Systems

For more facts circle 538 on Reply Card

OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by H. E. B. Anderson

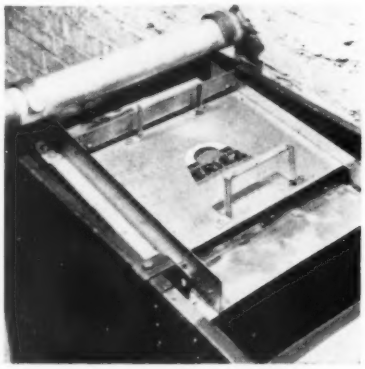
Coolant Cleaning With Magnets

ABRASIVE METALLIC PARTICLES present in coolant oil created a repetitive and expensive problem for Sheridan Products, Inc., Racine, Wisconsin.

During the drilling of 5-in. barrels for .22 caliber pistols, coolant is pumped down through the drills at 500-600 psi. It returns up along the drill flutes, passes through screens that remove chips, and is piped back into a reservoir for recirculation.

However, the screening operation did not remove the almost microscopic fines drilled from the chrome-moly, heat treated steel in the gun barrels. According to Sheridan engineers, the fines were exceedingly hard on the pumping equipment, and when the oil current slowed down for any reason, the fines accumulated and formed a thick mud. At the drill spindles, this condition caused breakage of drills and expensive breakdowns.

The condition was remedied with the installation of a permanent magnet ferrous cleaner at a point in the line just ahead of the reservoir. The return line was blocked and slotted above the inlet of the cleaner, which was made by Eriez Manufacturing Co., Erie, Pa., so that the coolant flow was distributed across the entire width of the cleaner.



Slotted return line serves as manifold to distribute coolant across cleaner face

Magnetic fingers on the cleaner grid remove contaminants from the oil as it flows through, and periodic removal of the grid for cleaning constitutes the effort required to keep the system functioning.

Foundry Conveyor Truck

Contributed by R. E. Franklin

ONE PHASE OF HANDLING mechanization in a large foundry has utilized available scrap angle iron to good advantage.

The core room had a bench with a reversible top so that when large cores were rammed, the cores could be dropped out of the core box for transportation to the drying oven. The heavy core was ordinarily moved by an overhead traveling crane, and bottlenecks were frequent as the undried cores piled up when the crane was unavailable.

Use of the crane has been eliminated by laying down special tracks made of angle iron. The lengths of angle are merely laid on the concrete foundry floor, not tied together or

(Continued on page 60)

Machine That Sizes and Cuts Wire Reduces 452-Hr Job to 18-½ Hr "Breeze"

BENCH MECHANICS at Temco Aircraft Corp. are now "cranking out" wires of correct length instead of hand-snipping them to size. An automatic wire-sizing and cutting machine developed at the Dallas, Texas plant turns out 11½-in. lengths of 0.041-in. wire at the rate of one per second.

Principal part of the 40-in. long machine is an aluminum wheel, 12½ in. in diameter. When the wheel is cranked, it operates a pull rod attached near its rim. This pull rod, in turn, activates a clamp mounted on a carriage which grabs and unreels the required length of wire from a spool at one end of the machine.

Wire is pulled the length of the machine through an aluminum tube, to emerge through a 0.062-in. bushing, over which is mounted a cutter.

With each revolution of the wheel, a roller on the wheel contacts the top of the cutter, pressing it down to cut the wire. A small spring returns the cutter to position after each cut.

The machine can be motor-driven.

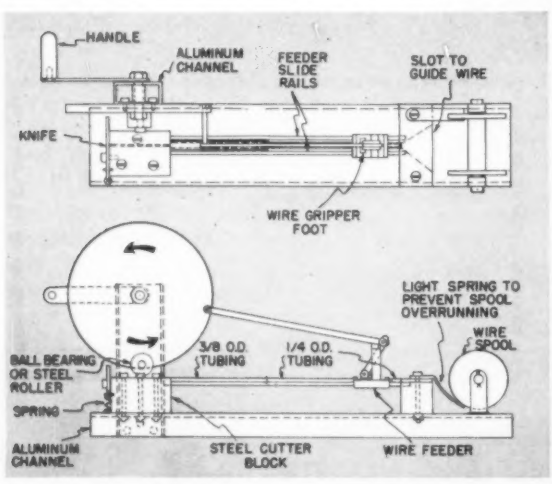


Fig. 1. Drawing highlights construction details of wire cutter

Fig. 2. Designer T. J. Kittrell illustrates operation of cutter

For more facts circle 539 on Reply Card ——→

STOP WASTE MOTION...BOOST OUTPUT EVERY HOUR

WAYNE *Production-Booster* HOSE REELS

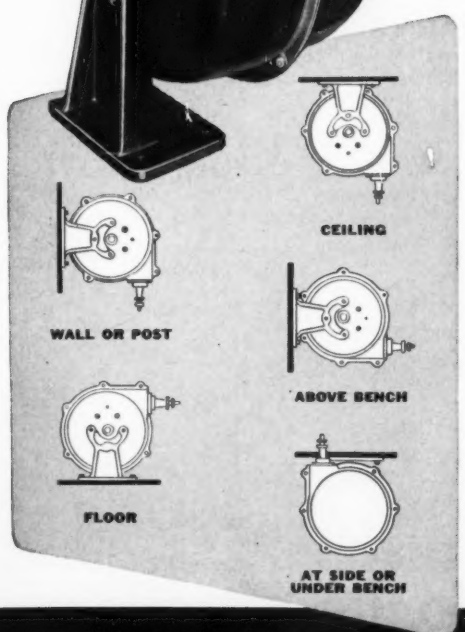
EASY TO USE: Pull tool or spray gun to required hose length . . . it locks firmly. Slight pull releases catch and hose rolls back automatically to pre-determined setting—just like a window shade!

HANDY TO USE: Tools are out of the way but always within easy reach. Mounts in any position, permits centrally located tool for use by several operators, or one. Saves working space, too.

WORK-SAVING: Cuts waste motion, lessens worker fatigue, widens work-radius. Finger-tip control of tools. Quick installation, easy adjustment, simple maintenance.

Besides all this, the Wayne Hose Reel saves wear and tear on your hose, reduces drop-breakage of tools, prevents accidents caused by loose hose.

Write for illustrated data folders on cost-cutting, job-engineered Wayne Production-Booster Hose Reels.



Compare These Wayne Advantages

Automatic Rewind	Powerful Spring Motor	Automatic Brake
Rubber Bumper Stop	Constant Spring Tension	Universal Bracket
Hose I.D. Sizes, ¼", ⅜", ½"	Rugged Steel Construction	Hose Lengths, 15' to 50'
	Open or drum-type Models	

INDUSTRIAL HOSE REELS for Air, Water, Grease, Oil, Fluids

THE WAYNE PUMP COMPANY

SALISBURY, MARYLAND — TORONTO, CANADA

Wayne

NATION WIDE SERVICE

LIFTS

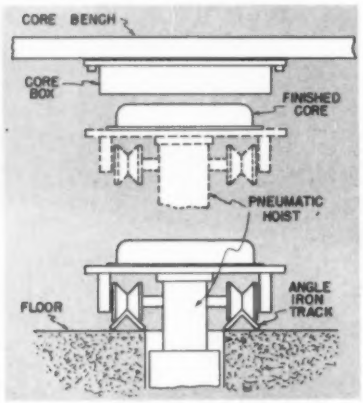
COMPRESSORS

LUBRICANT DISPENSERS

INDUSTRIAL PUMPS

OPERATION—PRODUCTION

(O and P begins on page 58)



Relation of bench, hoist, truck and track positions are shown in drawing

anchored in any way. The sand which inevitably paves the average foundry floor holds the iron in place but does not foul the inverted angle iron tracks.

Using the new procedure, the truck with special V-notched wheels is raised to the core by means of a pneumatic hoist sunk into the floor, and is then lowered to the angle iron track with the core in place for ramming.

After being lowered to floor level, the core is moved to the drying oven on the truck, without use of the overhead crane.

Steam Cleans Spray Guns

SPRAY GUNS used with hot plastic compounds are difficult to clean when the plastic in them has cooled after use. They are again troublesome when preparing them for use, since plastic in the line often overheats while the heating element in the gun is being brought to temperature.

A steam cleaner and preheater developed at the Key West, Fla., Naval Station has improved plastic spray operations considerably. To clean a gun internally, steam is forced through it from a rubber hose. The plastic inlet hose is then removed and the gun is screwed into a steam line, to feed low pressure steam through the plastic channel.

To clean the guns externally or to preheat them prior to use, a sheet metal box was constructed to function as a steam chamber. A platform of ¼-in. mesh metal cloth, secured about 2 in. above the bottom of the box, permits steam flow around the guns being cleaned.

Prime cost-saving feature of the steam cleaner is that it has obviated the necessity of dismantling the spray guns for cleaning after each use. In addition to the manhours saved, decreased wear on springs and machine threads has cut down on replacement parts required.

Spray gun is cleaned by "spraying" steam, as fouled guns get steam bath

Remote Control Lift Truck

WITH TRAVEL, steer and lift controls mounted in a control box on the platform, a "walkie" type electric truck has been developed for the selection and removal of stock from racks or shelves. With the operator never having to leave the platform of the truck

(Continued on page 62)

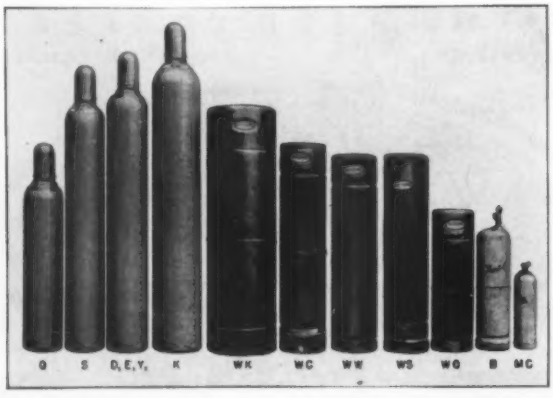
What Size Cylinder Do You Need? Size Comparison of "Bottles" May Help

INFORMATION offered by the Linde Air Products Co. will help in ordering oxygen and acetylene cylinders, by insuring that the correct size is ordered for a particular need.

Photograph shows the current types of cylinders. Other types, no longer being made, may still be in circulation in some parts of the country, but are not included in this listing.

The height shown for oxygen cylinders includes the cap. Since the height for any particular type of acetylene cylinder varies considerably, there is a corresponding variation in weights. The height and weight shown for these cylinders are averaged figures.

Acetylene pressure at 70 F, given at 250 psi, is the pressure at which acetylene is stored while dissolved in acetone. The acetone is, in turn, soaked into a porous filler in the cylinder. Free acetylene should never be stored at pressures greater than 15 psi.



Type	Gas	Contents cu ft	Psi at 70 F	Height in.	O.D.	Weight full (lb)	Weight empty (lb)
K	Oxygen	244	2,200	56	9	153	122
D	Oxygen	122	2,200	48	7½	125	115
E	Oxygen	122	2,200	48	7	92	82
Y	Oxygen	122	2,200	48	7	92	82
S	Oxygen	150	2,200	51	7⅜	92	80
Q	Oxygen	80	2,200	35	7⅛	70	65
WK	Acetylene	323	250	42	12⅞	244	222
WC	Acetylene	110	250	33⅝	8⅝	92	84½
WW	Acetylene	110	250	33⅝	8⅝	92	84½
WS	Acetylene	133	250	35½	8½	78	69
WQ	Acetylene	60	250	24¼	7⅝	55	51
B	Acetylene	40	250	25	6¼	32½	—
MC	Acetylene	10	250	15	4	9½	—

Line-up of cylinders, both oxygen and acetylene, shows relative sizes. Table at right gives weight and volume details

For more facts circle 540 on Reply Card ——→

STANOIL
TRADE MARK
Industrial Oil

12 years of the right oil keeps air compressor . . . .

■ Keeping this air-compressor trouble-free and always on the job is a "must" at General Chemical's fluorspar mine located near Boulder, Colorado. Under rough conditions of fluctuating loads the compressor supplies air for air tools, rock drills, slushers and other vital mining tools.
Constant operation calls for an oil that will keep wear to a minimum . . . and assure trouble-free compressor out-put to keep these tools working.
In a recent twelve year stretch, STANOIL #31 was the oil relied on to keep this unit on the job.
At the end of this period the engine was taken down for inspection. With this hard-working oil assuring day-in day-out protection these were the findings. There were no carbon deposits and no cylinder wear. Protection had been so thorough that the rings showed *no signs of wear whatsoever!* In fact, they were in such like-new condition that they were put back into use!

. . . GOOD AS NEW!

This is Standard Oil's E. K. Arnston who helped General Chemical save time and money with superior lubrication. For help like this call your nearest Standard Oil office or write to Standard Oil, Chicago.

STANDARD OIL COMPANY (*Indiana*) **STANDARD**

Snap-on MASTER GENERAL SET ½" SQUARE DRIVE

SET 368A-M-B

—covers widest range of wrench operations

By far the widest range of nut turning operations, in both production and maintenance, are covered with this Master Wrench set—½" drive, wrench sizes from ⅜" to 1¼". With this set your men have at their finger tips every combination of handle, adaptor, extension and socket to speed any job in this wrench size. On job after job you get the pay-off of Snap-on's superior speed, flexibility, durability. The sturdy Mechanikit chest has tote-tray and drawers for orderly tool arrangement and safekeeping. Available through your nearby Snap-on branch. For Snap-on industrial catalog and 104-page general catalog of hand and bench tools, write—

SNAP-ON TOOLS CORPORATION

8068-J 28th Avenue, Kenosha, Wisconsin

"Snap-on is the trademark of Snap-on Tools Corporation"

For more facts circle 541 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 58)

Operator guides movements of truck and platform from position on platform

during a stock picking job, it has changed stock selection from a two-man to a one-man job.

The complete operation is handled through a control box mounted directly in front of the operator, who stands on the front of the truck's platform. Raising or lowering the platform is controlled by push buttons enclosed in the operating panel.

Only one handle is used to control the four operations of horizontal travel, and the operation of forward and reverse travel is limited to first speed, to minimize the possibility of accidents while the truck is in motion.

This remote control, developed by Barrett-Cravens Co., enables the operator to go up and down aisles, steering easily while selecting stock.

Magnetic Jig for Fan Vanes

PERMANENT MAGNETS have been found to be the simplest holding device that can be used to position components for welding.

American Blower Corp., Dearborn, Mich., reports the magnets time-saving, in addition to their contribution to the accuracy of assembly work.

Welding vane assemblies for fans requires complete restriction of movement of the parts during the welding operation. As an approach to the problem, American Blower considered the use of permanent magnets in the hub of the welding fixture, to hold the vanes in place.

Mounting a 16-in. circular steel

B.F.Goodrich

TW ANALYSIS helps forge plant increase industrial tire service over 500%

This truck is hauling a 5-ton die-holder in a large Cleveland forge plant. B. F. Goodrich oil-resisting tires on front wheels have delivered over 2688 hours of hard service where ordinary tires fell apart after only 500 hours.

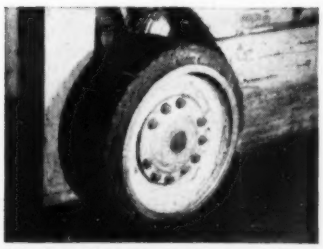
THE maintenance men of a large Cleveland forge plant had a real problem on their hands. Industrial tires in heavy-duty service were "falling apart" under heavy loads after only 500 hours.

The local B. F. Goodrich man made a Tire and Wheel Analysis. As a result of his findings, new Deluxe Cushion Pressed-On tires with an oil-resisting compound were placed on a truck in regular service. Most of the trucks in this type of service have since been equipped with B. F. Goodrich oil-resisting-compound tires. Service hours have been increased more than 500%.

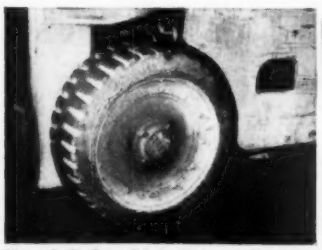
Pressed-On Deluxe Cushion tires are available with non-directional traction tread and in some sizes with smooth tread . . . and are made in a variety of compounds to meet any type of service condition. A special process that bonds the tread to the steel base assures positive adhesion of tread for life of the tire.

TW ANALYSIS CAN SAVE YOU MONEY

Just contact your local B. F. Goodrich retailer or mail the coupon below. Without cost or obligation, a trained B. F. Goodrich man will study your materials handling operations and make recommendations that can cut your industrial tire costs . . . reduce maintenance expense. The advice you receive will be unbiased, for B. F. Goodrich makes a *complete* line of industrial tires for every type of service. A special TW Analysis is available for manufacturers of industrial equipment.



Here's a close-up of the front tire on the truck pictured above. 2688 hours of service and still rolling!



This B. F. Goodrich Deluxe Cushion tire has been in service for 770 hours. Tread shows little wear.

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

Specify B. F. Goodrich tires when ordering new equipment

The B. F. Goodrich Company
Tire & Equipment Division
Department TW-419
Akron 18, Ohio

Please send me:
- ☐ Additional information on your Tire and Wheel Analysis Plan
- ☐ Free copy of "Industrial Tire Guidebook"
- ☐ Free copy of "How to Get Extra Service out of Solid Industrial Tires"

Name_____
Company_____
Street_____
City_____ Zone____ State____

For more facts circle 542 on Reply Card

NOW YOU CAN MAKE YOUR OWN NYLON REPAIR PARTS

fabricated from **POLYPENCO**® */ nylon shapes*

- Make one part or hundreds economically on standard metalworking tools
- Reduce wear on gears, bearings, gaskets, cam followers, etc.
- Eliminate lubrication
- Eliminate corrosion on exposed surfaces
- Eliminate backlash and noise
- Get top performance in every part with quality-controlled Polypenco nylon shapes

Immediate delivery of POLYPENCO nylon rod, tubing, strip and slab. We'll help you fabricate.

WRITE FOR GENERAL BULLETIN

POLYPENCO NYLON

nylon and teflon*/ other non-metallics / *stock shapes, finished parts*

also available to your specifications

The POLYMER CORPORATION of Penna. • Reading, Penna.

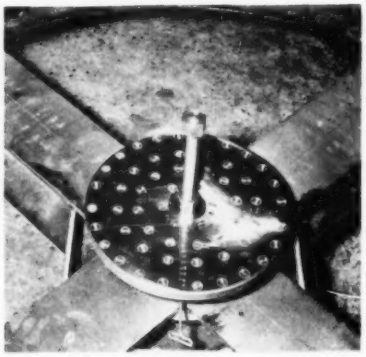
In Canada: Polypenco, Inc., 2052 St. Catherine, W. Montreal, P. Q.

**trademark for Du Pont tetrafluoroethylene resin*

For more facts circle 543 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 58)



Permanent magnets, embedded in steel at fixture hub, hold fan for welding

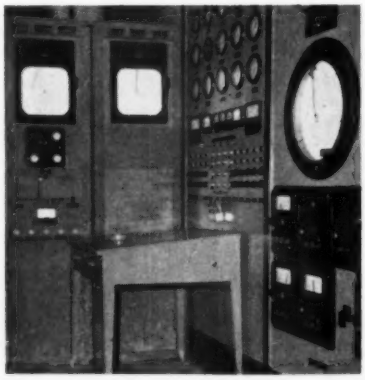
plate at the center of crossed I-beams, holes were drilled for 58 permanent magnets, each 11/16-in. in diameter. The magnets, manufactured by the Carboloy Department of General Electric, were installed in the plate, insulated from it by thin-wall aluminum tubing and washers. The vane hub holds rigidly when placed in position for the blades to be welded between the hub and the outer ring.

Radio Cabinets Add Panel Space

Contributed by L. W. Fitzpatrick

INSTALLING TWO REMOTE telemetering systems on our already cramped boiler panel board presented space-finding difficulties. Erection of a wing on one end of the main panel, on which to mount the instruments and recorders required, proved the answer to the problem.

Large rack-type radio cabinets made of aluminum were chosen, because they are inexpensive, readily available,



Twin radio panels form wing on boiler control panel to accommodate controls

For more facts circle 544 on Reply Card

Qwik Change

with **PACKAGED Motor Starter PARTS!**

New PUSH BUTTON KIT

OTHER KITS...

- Selector Switches
- Interlocks
- Replacement Parts
- Contacts
- Coils
- Overload Relays

EASY to Identify!

Easy-to-read catalogs, simplified motor control and overload relay selectors, illustrated service bulletins...these all combine to assure *quick changes* through easy parts identification.

EASY to Buy!

Conveniently packaged and labeled conversion parts are immediately available "off-the-shelf" from nationwide network of authorized Square D electrical distributors.

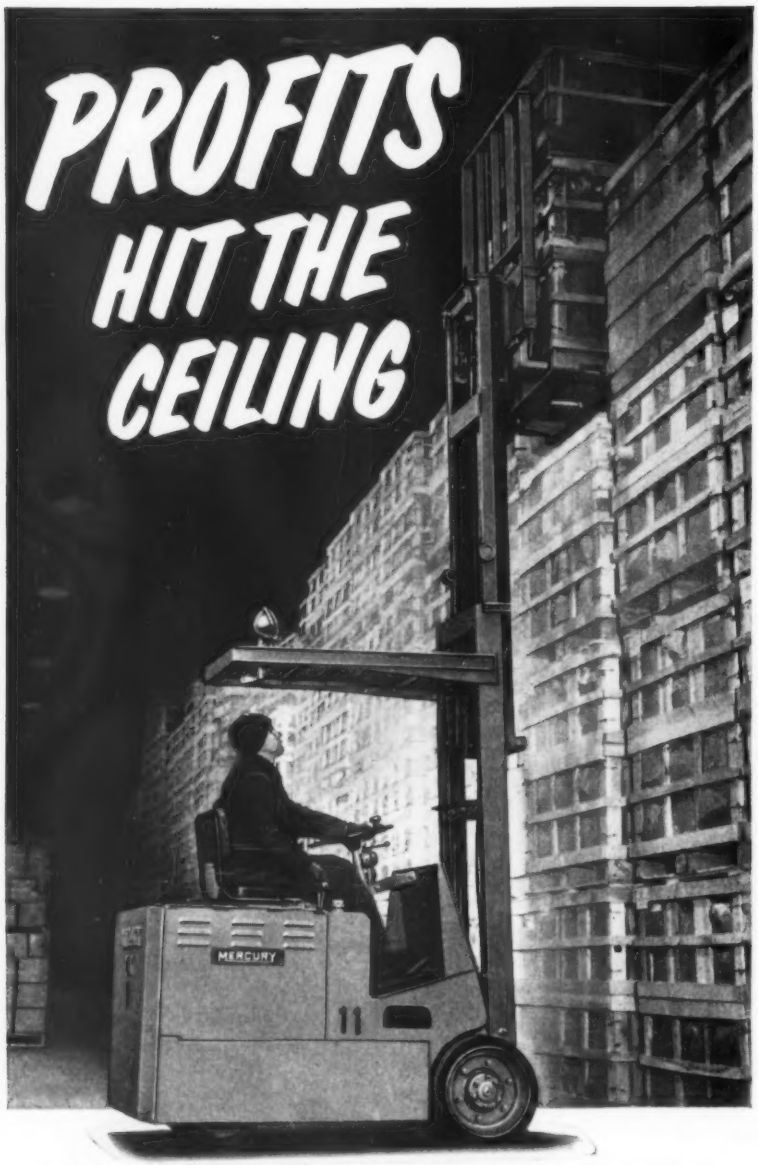
FASTER to Install!

Conveniently packaged parts can be installed using only a screw driver and without disturbing any wiring.

Write for Bulletin 9999. Address Square D Company, 4041 North Richards Street, Milwaukee 12, Wisconsin.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY



MERCURY "YAK" TIERS 4,000 POUND LOADS TO HEIGHTS OVER 22 FEET

Produce Terminal Cold Storage Co., Chicago, operating nearly 3,000,000 cubic feet of freezer, cooler and convertible refrigerated space, gains full utilization of every foot of storage by tiering loads clear to the rafters with MERCURY "Yak" fork trucks. Loads 48" long are tiered to heights over 22 ft. from 12 ft. aisles.

Advanced design features of the YAK 430 are . . . higher maximum fork elevation . . . increased free lift . . . greater speed . . . lighter chassis weight . . . shorter turning radius . . . simple *low* pressure hydraulic hoist system . . . new unit drive with quick detachable motor and self-energizing hydraulic brakes.

MERCURY — the world's largest builder of industrial haulage equipment and originator of the "Trackless Train."

MERCURY
FORK TRUCKS · TRACTORS · TRAILERS

MERCURY MANUFACTURING COMPANY
4002 S. Halsted St., Chicago 9, Ill.

For more facts circle 545 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 58)

rigid and compact. The cabinets measure 83½ in. high, 22 in. wide and 18 in. deep. Actual panel space provided was 77 in. by 19 in.

With this arrangement, equipment is easily moved from one cabinet to another, and the replaceable panels provide for easy new equipment installation or panel changes. The aluminum is rigid enough to support large recorders without additional bracing.

Completely enclosed, the cabinets can be entered through a rear access door. Slight fitting tolerances between panels were made dust-tight by taping the inside of joints with plastic tape.

Magazines on Coat Hangers?

Compact but voluminous magazine rack uses wire coat hangers to store current issues. Designed by Mrs. G. C. McNutt of Los Angeles ad agency, rack is on casters, features alphabetical spacers

Conveyor Repair in a Hurry

Contributed by H. B. McDermid

IN A FULLY MECHANIZED non-ferrous foundry, a horizontal sand conveyor belt fortunately wore out slowly enough to give the maintenance foreman time to prepare for a "quick change" of belts, before the belt pulled apart completely and shut down the operation.

Thirty-six inches wide, the conveyor belt rode on head and tail shafts 400 ft apart. This extremely large belt promised to be difficult to handle, particularly in the speedy manner intended.

In preparation for the change, the new belt, rolled on a reel, was placed behind the tail shaft pulley, in line

For more facts circle 546 on Reply Card——→

ELECTRICAL CONDUIT

PERMANENT
EASILY INSTALLED
LIQUID-TIGHT
FLEXIBLE
APPROVED

SEALTITE (TYPE U.A.) is approved by Underwriters' Laboratories, Inc. for use where exposed to moisture or mineral oils (up to 60C). See N.E. Code, Art. 351.

SEALTITE
ELECTRICAL CONDUIT PROTECTS WIRING

against oil, grease, water, dirt, chemicals, corrosive fumes, salt spray, weather

SEALTITE* is a flexible *and* liquid-tight electrical conduit. It gives maximum protection to your wiring when it must connect moving parts, absorb vibration, follow machine contours, flex into U-bends, be easily maintained or be safeguarded between misaligned ports.

It is being used successfully in wet locations, in tunnels, power plants, steel mills, canneries, chemical industries and in many outdoor applications. SEALTITE comes in two types:

TYPE U. A.—UL-approved. Made with flexible galvanized steel core, positive ground and tough outer cover.

NOM. I.D. (Inches)	INSIDE DIA. (Inches) Min.	Max.	OUTSIDE DIA. (Inches) Min.	Max.	APPROX. INSIDE BEND DIA. (Inches)	EST. WEIGHT per hundred ft. (Pounds)
⅜	.484	.504	.690	.710	8	30.0
½	.622	.642	.820	.840	10	36.6
¾	.820	.840	1.030	1.050	15	48.2
1	1.041	1.066	1.290	1.315	18	87.7
1¼	1.380	1.410	1.630	1.660	21	116.5

TYPE E. F.†(Extra Flexible)—for machine tools and industrial equipment. (Meets standards set by J.I.C.) †Pat. Applied For

NOM. I.D. (Inches)	INSIDE DIA. (Inches) Min.	Max.	OUTSIDE DIA. (Inches) Min.	Max.	APPROX. INSIDE BEND DIA. (Inches)	EST. WEIGHT per hundred ft. (Pounds)
⅜	.485	.505	.690	.710	5	24.3
½	.620	.640	.820	.840	6	29.0
¾	.815	.835	1.030	1.050	9	38.2
1	1.025	1.055	1.290	1.315	10	65.0
1¼	1.365	1.395	1.630	1.660	13	84.4
1½	1.575	1.605	1.870	1.900	15	122.0
2	2.020	2.055	2.335	2.375	17	158.0
2½	2.480	2.515	2.840	2.875	20	205.0
3	3.070	3.110	3.460	3.500	27	290.0
4	4.000	4.050	4.460	4.500	34	430.0

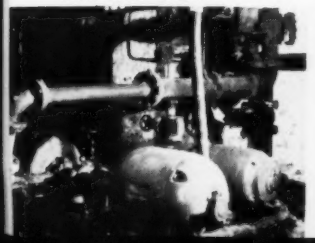
Commercial tolerances apply on above figures.

ELECTRICAL WHOLESALERS stock both types. Buy it in long random lengths as shown; then cut without waste. Or ask your wholesaler to cut the length you need. Liquid-tight connectors are available from wholesalers' stocks. Write for Bulletin UA-531. *The American Brass Company, American Metal Hose Branch, Waterbury 20, Conn.*

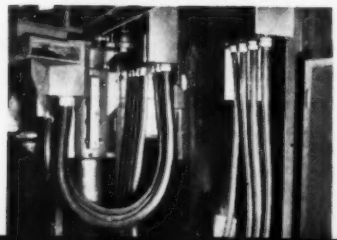
*Trade Mark 54175

SEALTITE flexible, liquid-tight electrical conduit an **ANACONDA**® product

FOR WET SPOTS

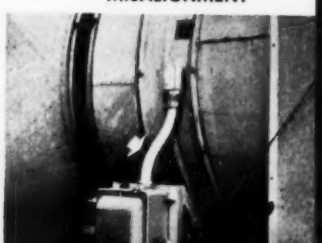


MOVING CONNECTIONS



OUTDOORS

MISALIGNMENT



Does Your Plant Have Lines Carrying Corrosive Liquids ?

Then You Should Know About

Rockwell-Nordstrom *Valves*

Rockwell-Nordstrom valves resist corrosion better than other valves because the vital seating area of a Rockwell-Nordstrom valve is never exposed to the line fluid. A thin film of lubricant covers the entire seating surface preventing corrosive fluids from acting upon this critical area.

In addition, Rockwell-Nordstrom valves are manufactured in a wide range of special corrosion-resistant metals.

For longer life and trouble-free valve operation, install corrosion-resistant Rockwell-Nordstrom valves at your plant.

There's a new bulletin prepared by Rockwell Manufacturing Company describing corrosion-resistant valves for industrial services. Mail the coupon below for your free copy today!
Rockwell Manufacturing Company, Pittsburgh 8, Pa.

Rockwell-Nordstrom Valves

Lubricant-Sealed for Positive Shut-Off

Canadian Licensee:
Peacock Brothers Limited.

ROCKWELL MANUFACTURING COMPANY 543...
Pittsburgh 8, Pa.

Please send me Rockwell-Nordstrom Valve Catalog V-217.

Name_____ Title_____

Company_____

Street_____

City_____ Zone_____ State_____

For more facts circle 547 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 58)

with the conveyor centerline, with the loose end of the belt unwinding from the top of the reel.

When the conveyor was stopped (on a late shift, to minimize shutdown losses) the old belt was cut, across the face of the tail pulley. The new belt was then temporarily attached to the end of the old one. Two men slacked off the tension screws on the tail pulley, so it could be adjusted if necessary.

Next, men moved into position to pull out the slack on the lower strand of the old belt as fast as it came toward the tail pulley. The conveyor head shaft was set in motion, and the new belt was pulled through the conveyor frame, over the idler rolls to the head shaft, and then back toward the tail shaft. When the temporary splice between the old and the new belts, moving along the bottom of the conveyor frame, got to the tail shaft pulley, the head shaft was stopped, the new belt cut to proper length, and the belt ends joined with metal splice clamps. The conveyor tension was adjusted, and the belt was ready to resume regular service.

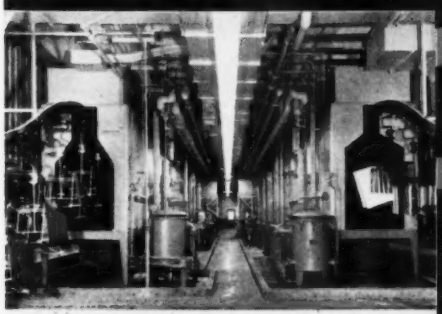
▶ *Our former paper-making editor claims this procedure has been used for some time in the paper trade, handling dryer "felts," but its adoption for conveyor belts in industry is an interesting one.—Editor.*

Welding Rod Ladder at New Plant

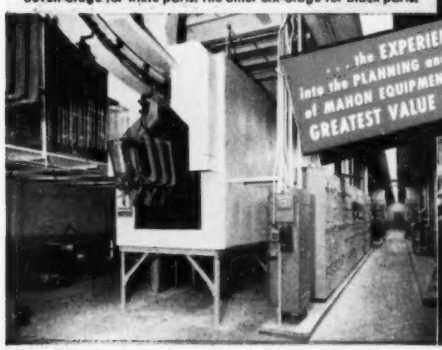
Riding on a conveyor from a brushing station at the rate of 800 to 1000 electrodes a minute, electrodes are picked up by conveyor "ladder" for ride through baking oven. Installation is one of many innovations at Westinghouse's new welding and brazing rod plant, located in Montevallo, Alabama

COMPLETE *Finishing* SYSTEMS

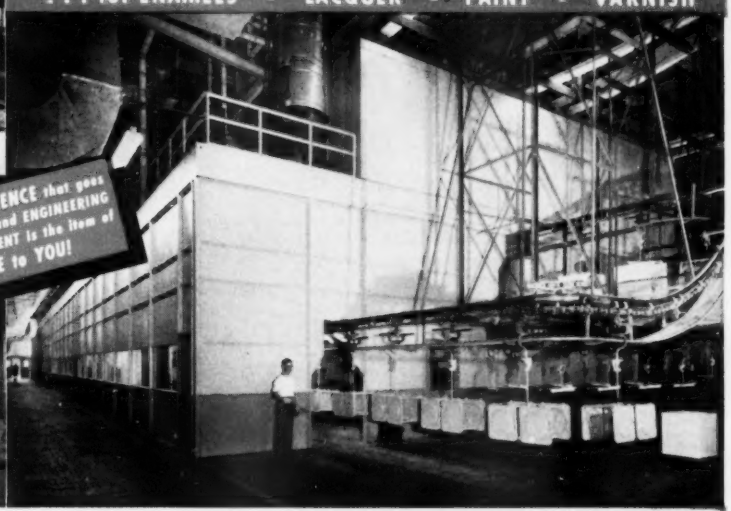
. . . for ENAMELS • LACQUER • PAINT • VARNISH



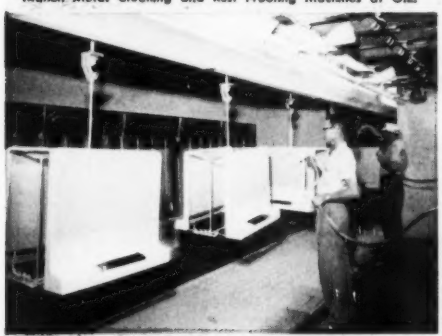
Mahon Metal Cleaning and Rust Proofing Machines at G.E. One is Seven-Stage for white parts. The other Six-Stage for black parts.



One of the two Mahon Dry-Off Ovens at the Exit End of the Mahon Metal Cleaning and Rust Proofing Machines at G.E.



General view showing exterior housing of the Complete Mahon Finishing System in General Electric's Home Laundry Equipment Department at Louisville, Kentucky. This Housing encloses all processing and painting operations. Finish Baking Ovens are located above the enclosure.



One of two Mahon Hydro-Filter Spray Booths in the Complete Mahon Finishing System at General Electric Co., Louisville, Ky.

Through the glass you see the interior of the Mahon Automatic Electrostatic Spray Booth, where finish coat enamel is applied.

More and More HOME APPLIANCES Receive Their FINE FINISH in Modern, COMPLETE MAHON FINISHING SYSTEMS!

In the Home Laundry Equipment Department of General Electric Company, Louisville, Kentucky, a Complete Mahon Finishing System produces the fine finish demanded by one of the world's largest home appliance manufacturers. The system includes an enclosure, which houses all metal processing and painting equipment, with Finish Baking Ovens, Heating Units, Filtered Air Supply and Exhaust Fans located above . . . it is a complete, ultramodern finishing system combining and coordinating all major units of equipment and other essential facilities into an efficient, smooth-running, economical production operation. There are actually three finishing lines in this system: One is a flow coating line for black parts. Another flow coating line applies the first coat of enamel—both Flow Coaters are equipped with controlled atmospheric paint surface conditioning chambers in the drip zone. The third line is a combination manual and automatic electrostatic spray for the finish coat of enamel. If you are contemplating new finishing equipment, you, like thousands of other quality-minded manufacturers, will find that Mahon engineers are better qualified to advise you on both methods and equipment requirements . . . and better qualified to do the all-important planning, coordinating and engineering of equipment—which is the key to fine finishes at minimum cost. You will find also, that Mahon equipment is built better for more economical operation over a longer period of time. Mahon will furnish your complete system on one contract . . . undivided responsibility for the entire job safeguards you against complications which may upset your production plans and subsequent schedules. See Sweet's Plant Engineering File for information, or write for Mahon Catalog A-655.

THE R. C. MAHON COMPANY

HOME OFFICE and PLANT, Detroit 34, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

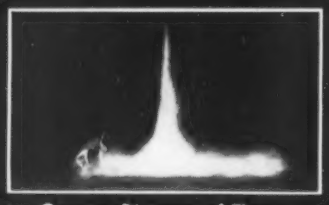
Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling, and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems and Drying and Baking Ovens, Cooling Tunnels, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other Units of Special Production Equipment.

MAHON

For more facts circle 548 on Reply Card

Put heat where you equipment for the job!

HEAT PATTERNS UNLIMITED! Laboratory smoke tests show how TRANE Unit Heaters with exclusive Louver Cone and Louver Fin Diffusers can direct heat in *any* direction, in *any* proportion — even in *different* directions and proportions at the same time. Unretouched photos illustrate the flexibility of these TRANE units—unequalled by any other unit heater made.



Greater Distance of Throw

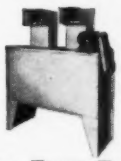
A Flood of Heat

want it...with the right

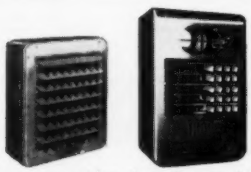
Choose from the industry's most complete line!

TRANE heating products are designed and built together—for service together. *Selection* of the right product for your needs is simpler—more certain. *Responsibility* is concentrated in one reliable source. Call your nearest TRANE Sales Office or write TRANE, La Crosse, Wisconsin.

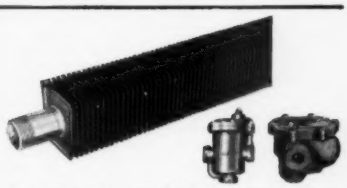
For high ceilings or low—for general all-purpose heating—TRANE Projection Heaters with exclusive patented Louver Cone Diffusers "spot" heat *exactly* where it is needed.



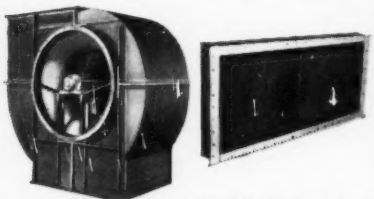
For large areas, TRANE Torridors have powerful centrifugal fans . . . capacities up to 1½ million Btu's. Use with or without ducts—for heating, ventilating, filtering, process drying.



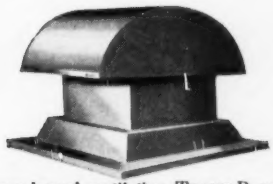
For doorways, cold walls and general heating—TRANE Horizontal Unit Heaters with exclusive patented Louver Fin Diffusers are a flexible, economical answer. Hot water, steam or gas-fired.



For long walls or draft protection beneath windows and skylights, TRANE Wall-Fin is a low-cost solution. *For saving fuel,* TRANE Float or Bucket Traps and Strainers add efficiency, stop waste.



For "built-up" systems, TRANE Fans and Coils are "matched" for service together. Exclusive TRANE features give top efficiency, durability—reduce maintenance to a minimum.



For year 'round ventilation, TRANE Power-Driven Roof Ventilators exhaust inside air or supply outside air. TRANE Ventilating Heaters supply *heated* air in winter to offset negative pressures.

one source • one responsibility

TRANE

manufacturing engineers of

AIR CONDITIONING, HEATING,

ventilating and heat transfer equipment

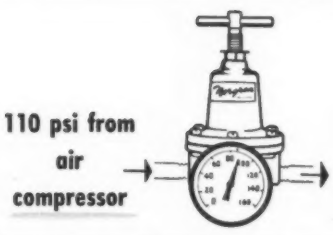
The Trane Company, La Crosse, Wis. • Eastern Mfg. Div., Scranton, Pa. • Trane Co. of Canada, Ltd., Toronto • 90 U.S. and 15 Canadian Offices

4 ways to cut compressed air costs

with an investment of only $9.20*

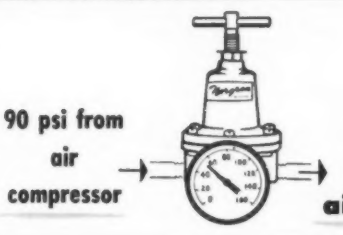
*for a standard ⅛", ¼" or ⅜"

NORGREN PRESSURE REGULATOR with gauge



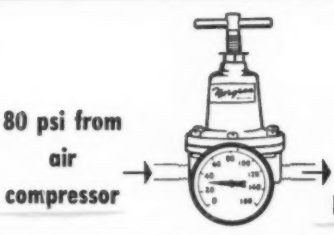
Don't use an Air Tool at 110 psi line pressure when 90 psi of air gives you top efficiency

Here a Norgren Pressure Regulator would save around 180,000 cubic feet of free air per year on one air tool used 50% of the time.



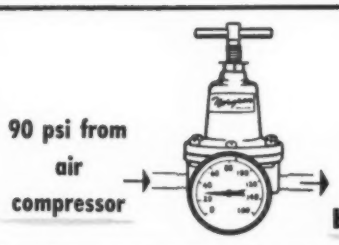
Don't use 90 psi air pressure on Clamping Cylinders, Air Chucks, etc. when 50 psi usually works as well

Normal use of a 2" dia. cylinder with a 2" stroke at Norgren-regulated 50 psi pressure would save about 7000 cubic feet of free air per cylinder per year.



Don't use line pressures of 80 psi for aerosol bearing lubrication when 30 psi does the job better

Recommended maximum pressure and flow are 30 psi and 2.8 cfm. A Norgren Regulator here could save approximately 150,000 cubic feet of free air per year per lubricator.



Don't use an Air Blow Gun at line pressure of 90 psi when 30 psi serves as well — and is safer

Here at the lower Norgren-regulated pressure of 30 psi you would save about 90,000 cubic feet of free air on one gun used an hour a day.

OTHER BIG ADVANTAGES of using the proper Norgren-regulated air pressures: 1 — less wear on your air equipment... 2 — money saved on maintenance costs.

WRITE FOR COMPLETE DATA

PIONEER AND LEADER IN OIL-FOG LUBRICATION FOR 26 YEARS

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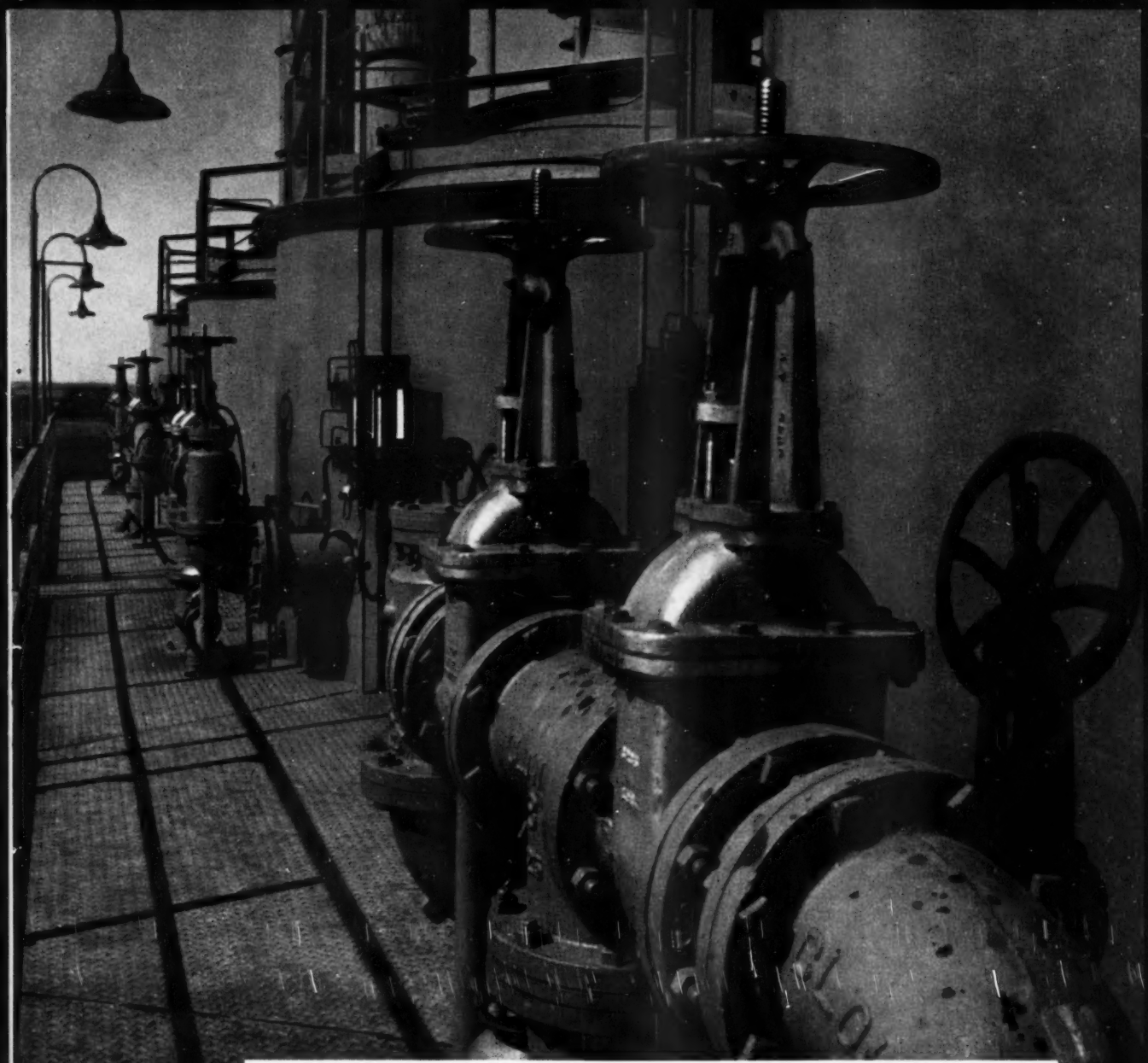


Sulfuric acid goes hungry here

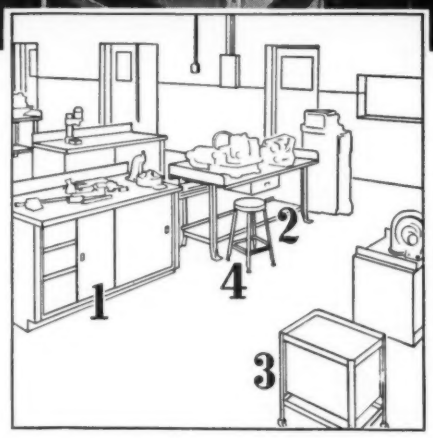
Takes a pretty tough alloy to keep sulfuric acid on a starvation diet.

Yet these 8″ gate valves of corrosion-resistant *Aloyco 20* do just that. They control the acid flow to four large absorbing towers in U.S. Industrial Chemicals' new 300-ton acid plant. Built by Leonard Construction Company at Tuscola, Illinois, it supplies acid for National Petro-Chemicals Corporation and the general market. *Aloyco 20* valves are standard throughout the plant for handling sulfuric acid.

Here, as in scores of industrial processing plants, Aloyco Valves speed the flow of chemical progress. Alloy Steel Products Co., Inc., 1301 West Elizabeth Avenue, Linden, New Jersey. 4.4

MODERNIZING YOUR LAB?
Fit it up FAST and at LOW COST
with standard HALLOWELL Shop Equipment

Your HALLOWELL distributor will be glad to give you the latest product information and help you select the best combination to fit your requirements. And because he carries a complete stock of this standard, interchangeable equipment, he can save you time and money. For more information, consult him or write STANDARD PRESSED STEEL CO., Jenkintown 26, Pa.



1. Cabinet Benches
2. Work Benches
3. Tool Stands
4. Stools and Chairs

HALLOWELL SHOP EQUIPMENT DIVISION **SPS** JENKINTOWN PENNSYLVANIA

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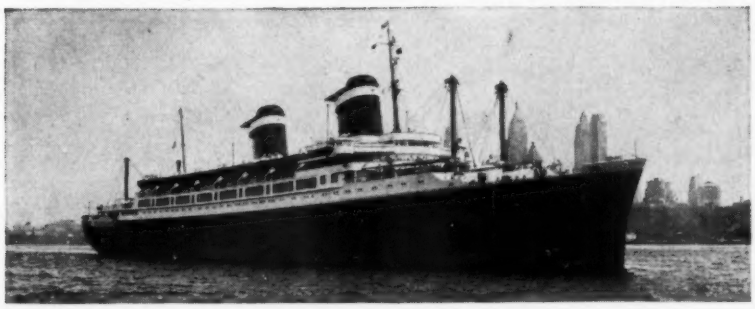
HALL INDUSTRIAL WATER REPORT

Hall Laboratories, Inc.—A Subsidiary of Hagan Corporation, Pittsburgh, Pa.

Volume 2 | OCTOBER 1954 | Number 5



Stops Scale in Seawater Evaporators

HAGEVAP LP* has been in continuous use in the large modern distillation plant on the S.S. *United States*, maintaining scale-free evaporators and assuring production of the highest quality fresh water, throughout her two years as queen of the North Atlantic passenger service.

These results on the S.S. *United States* confirm similar experience by United States Lines on the S.S. *America*, where HAGEVAP LP was introduced in the spring of 1949. In the intervening five years, the four multiple-effect salt-water evaporators on this liner have required almost no chemical or mechanical cleaning, while continuously and currently producing at better than rated capacity.

The two new luxury passenger liners of American Export Lines, the S.S. *Independence* and S.S. *Constitution*, entered the Mediterranean service in 1950 with HAGEVAP LP specified initially as the evaporator feed treatment. After four years' service, the huge seawater evaporators on these vessels are still free of scale deposits.

HAGEVAP LP feed treatment developed by Hall Laboratories and applied in the marine field by Bull and Roberts, Inc., is now the accepted standard for vacuum-type, single or multiple-effect seawater evaporators, and in most cases is specified by the owners or builders on new construction of passenger, cargo or tank vessels. In recent years, completely automatic feed treating equipment has been perfected, completing the full development of what amounts to push-button control of the problem of scale accumulations in seawater evaporators.

Wall Wrecker Whipped

Three times in two years an eastern Pennsylvania hospital had to tear out a wall in a new domitory building to replace corroded condensate return lines. Leaking lines had also stained ceilings and brickwork in other parts of the building, and the replacement of traps and unit heater coils was a constant expense.

Hall field engineer R. B. Carey recommended treatment of the system with a few ppm of Hagafilm,* which forms a thin film on the metal condensate lines.

In the three years since Hagafilm treatment was instituted, there has been no further failure of the condensate return system in any part of the building. Maintenance and replacement of traps and heater coils has ceased to be a problem.

*Registered Trademark

Hall Engineer to be Guest Speaker

R. K. Scott, head of the Identification Group at Hall Laboratories, will be a guest speaker at the X-Ray Diffraction School of the General Electric Company to be held in Milwaukee from September 27 to October 1. Subjects to be discussed will include the application of X-ray diffraction and fluorescence to chemistry, metallurgy, ceramics and other fields.

Mr. Scott will describe the work done by his group at Hall Laboratories, where X-ray diffraction is one of the means used to tell what substances are present in all sorts of samples of solid material. More than a hundred different constituents have been identified in deposits from boilers and other equipment in systems using water for all sorts of industrial operations.

Pamphlets Available

A series of pamphlets and booklets pointing out the practical importance of various phases of water conditioning has been published by Hall Laboratories.

Four of the pamphlets are now available on request.

1. What is Hall Laboratories?
2. Sources of Water
3. Boiler Water
4. Laying-up Equipment

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information, write, wire or call Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pa.

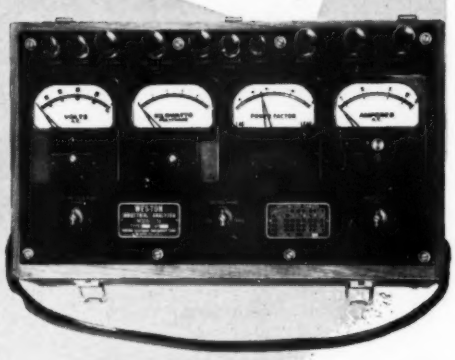
Water is your industry's most important raw material. Use it wisely.

tools that Streamline electrical maintenance

FOR POWER PROBLEMS...

FOR MOTORIZED EQUIPMENT...

FOR ELECTRONIC TROUBLE SHOOTING...



WESTON A-C INDUSTRIAL ANALYZER (Model 639) a combined Voltmeter, Wattmeter, Power Factor Meter, Ammeter . . . all interconnections made!

A real timesaver because only one hook-up is necessary to measure a-c current, voltage and power in single and polyphase circuits, as well as power factor in 3 phase, 3 wire, balanced circuits. Adequately insulated binding posts . . . high overload capacity. Furnished in compact oak carrying case measuring only 18⅞" x10⅞"x6⅞".

WESTON CLAMP VOLT-AMMETER (Model 633) measures current and voltage without breaking circuits and disrupting operations.

Combines in one instrument five full-scale a-c current ranges of 1000/250/100/25/10 amperes with range overlap for good readability . . . three self-contained a-c voltage ranges of 700/350/-175 volts, with instrument insulated for 750 volt service. Has convenient 6-position thumb switch for range selection, and adjustable pointer stop for measuring motor starting current.

WESTON INDUSTRIAL CIRCUIT TESTER (Model 785) the versatile 28 range super-sensitive portable tester.

Especially designed for checking electronic control and power equipment. Seven d-c voltage ranges: .1 to 1000 (20,000 ohms per volt) . . . six a-c voltage ranges: 5 to 750 (1000 ohms per volt) . . . six d-c current ranges: 50 microamperes to 10 amperes . . . four a-c current ranges: .5 to 10 amperes . . . five resistance ranges: 3000 ohms to 30 megohms . . . all ranges full scale . . . a-c and d-c current ranges extended with external transformer or shunts. New temperature compensated rectifier circuit gives greater a-c accuracy.

AVAILABLE THROUGH LEADING DISTRIBUTORS

WESTON *Instruments*

WESTON Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.

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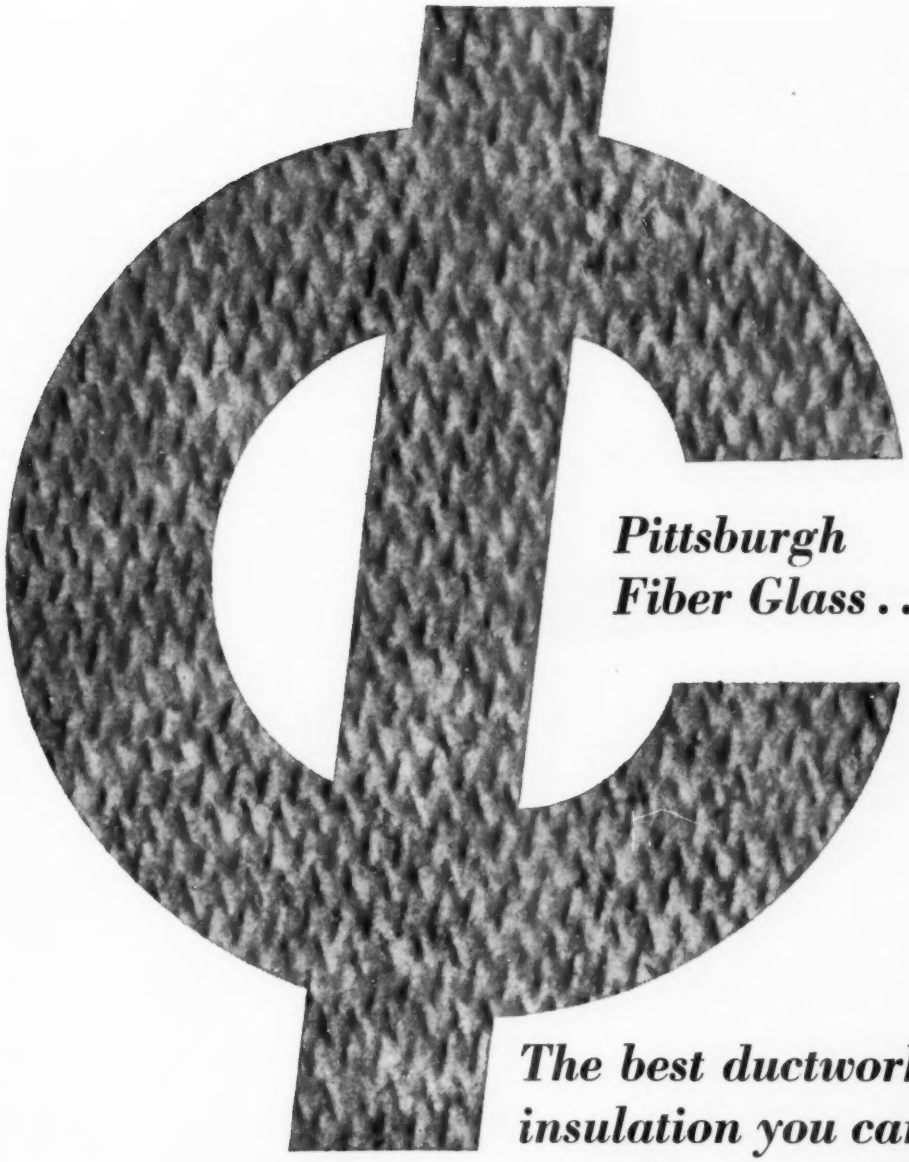

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The best ductwork insulation you can use costs less to install!

Besides its superior thermal and acoustical insulation qualities, Pittsburgh Superfine Fiber Glass Insulation is extremely easy to install as either duct liner or duct wrap . . . saves dollars for you on labor costs.

PPG Superfine is easily cut to shape with either knife or shears, fits all ductwork shapes easily. Applied with either adhesives, tapes, cord or wire, PPG Superfine's complete range of insulation thicknesses can be supplied with cloth, asbestos, paper, aluminum foil or vinyl facings to serve the specific requirements of any application.

Be sure to get complete facts on the unusual economies and quality insulation values that Pittsburgh Superfine Fiber Glass can provide your ductwork system. Write our executive offices or our district sales offices in Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia or St. Louis. Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pennsylvania.

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PITTSBURGH PLATE GLASS COMPANY

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YOU NEED A STAND-BY

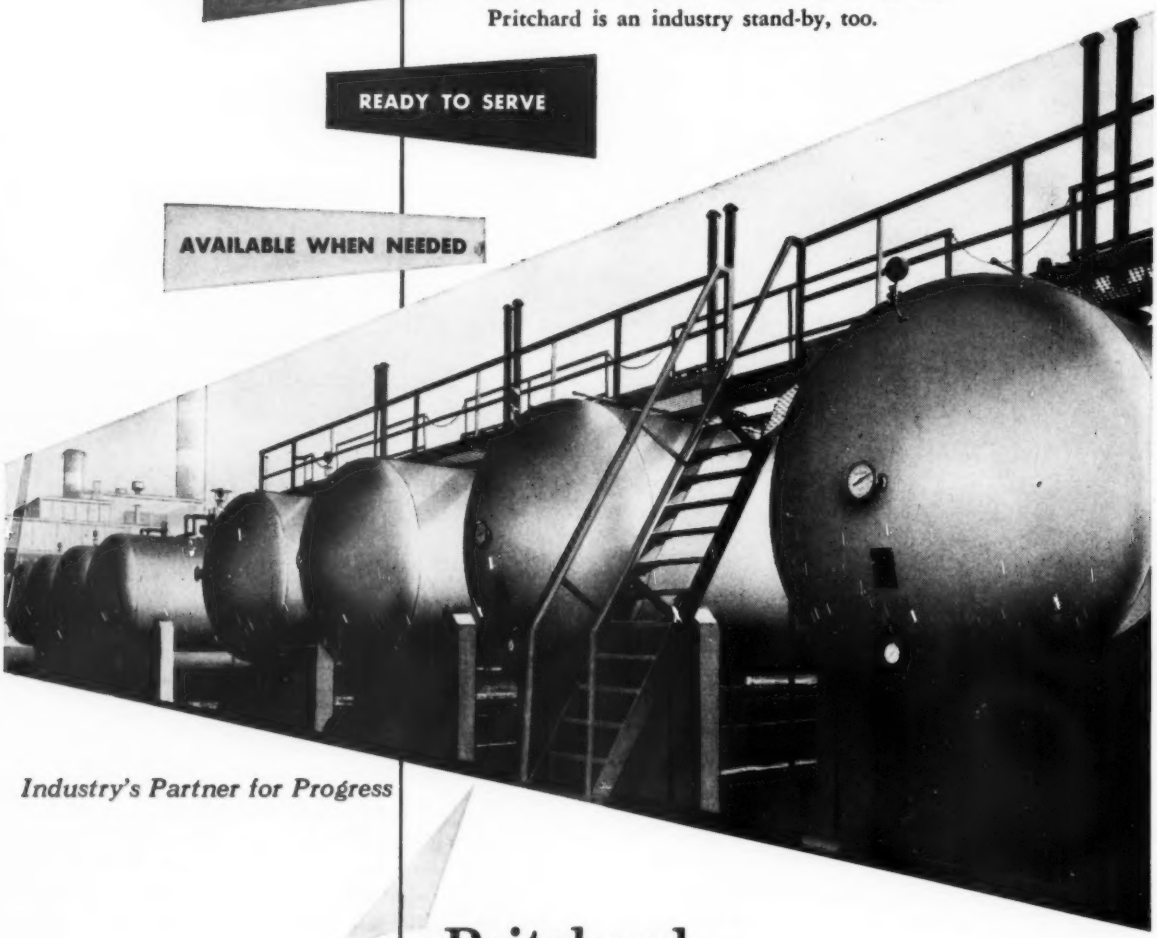
That's why Ford Motor Company has this line-up of propane storage tanks standing by at their Cleveland plant. Ford wanted an *assured* fuel supply at all times.

And why did Ford choose Pritchard to build its complete propane-air stand-by installation? Simply because the exceptional experience and abilities of Pritchard engineering and construction specialists has been proved on dozens and dozens of similar jobs. You see, Pritchard is an industry stand-by, too.

DEPENDABLE

READY TO SERVE

AVAILABLE WHEN NEEDED



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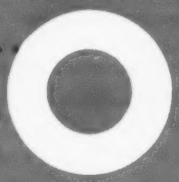
Cents per lb. for Bearing Bronzes Isn't the Whole Story...

IF YOU BUY A ROUGH-CAST BAR . . .

to make this

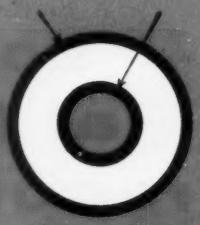


1" I.D. x 2" O.D.
Weight: 9.0 lbs./ft.

you get this

¾" I.D. x 2¼" O.D.
Weight: 13.5 lbs./ft.

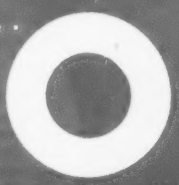
note the scrap loss



4.5 lbs./ft. lost!

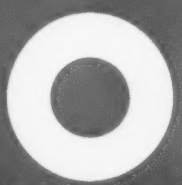
BUT IF YOU BUY ASARCON 773 . . .

to make this



1" I.D. x 2" O.D.
Weight: 9.0 lbs./ft.

you get this



31/32" I.D. x 2-1/32" O.D.
Weight: 9.7 lbs./ft.

almost no scrap!

Only 0.7 lbs./ft. lost!

Thus far only the SIZE (diameter) of the bronze has been considered. ALSO, with Asarcon 773 you are able to buy exactly the length you need, short or up to 105" long. You get no costly short-ends! More dollars saved . . . no remnants!

In addition, Asarcon 773 (SAE 660) stock bronze has no blow-holes, no pits and no shrinks. The patented continuous casting process by which it is made uses no sand; there are no inclusions in the metal to damage tools. Properties are far superior to those of the similar sand cast or permanent mold-cast alloys.

Asarcon 773 is available in 216 sizes — tubes and solids — from the stocks of distributors in principal cities. Continuous-Cast Bronze is also made to order in a wide variety of other alloys, in rounds and other shapes . . . up to 20' in length.
Use coupon below for NEW bulletin giving details.

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AMERICAN SMELTING AND REFINING COMPANY
Perth Amboy Plant, Barber, New Jersey

- ☐ Please send new brochure on Asarcon 773 stock bearing bronze
- ☐ Send literature on other Continuous-Cast Bronzes
- ☐ Send a salesman

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

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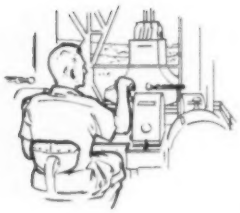


Look at the record!

15-Ton unloaders with EC&M control set new records in unloading time and low maintenance costs at the Baltimore & Ohio, Curtis Bay Ore Pier

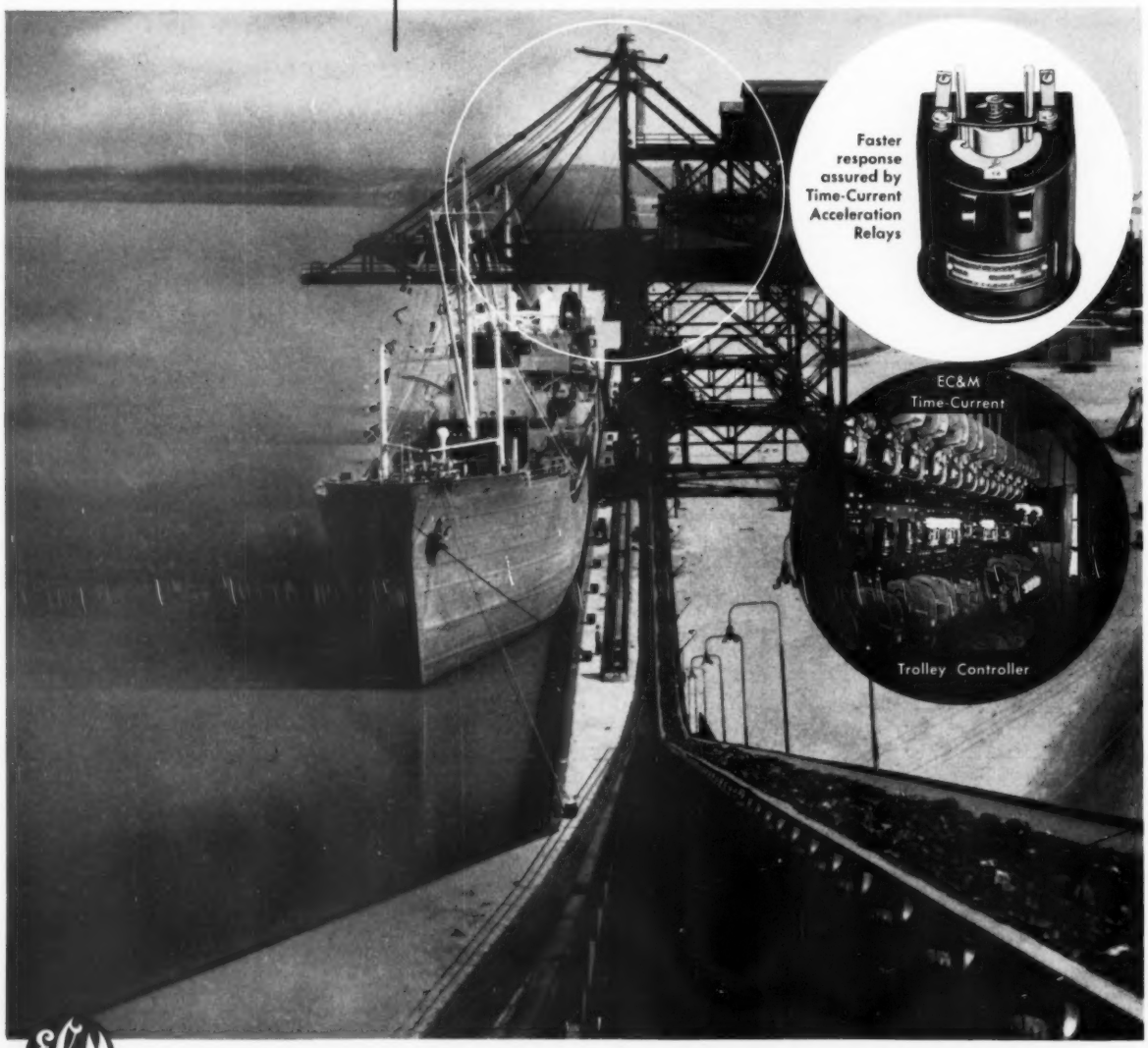
20,560 TONS OF IRON ORE UNLOADED IN 13 HOURS AND 55 MINUTES! Fast-operating EC&M Line-Arc Contactor Control with EC&M Time-Current Acceleration helped establish this record.

EC&M Control Apparatus and Control Engineering also provide outstanding safety during all operations. Power for motor drives is fed through operator's cab for safe, direct control. Dynamic braking for quick trolley stop is automatically applied in end-zones and if power fails. EC&M Quadruplex Controllers insure that the 4 bridge motors share the load equally and that brakes release and set uniformly.

Replacement part cost, in this installation, has been only 25¢ per 1000-tons of ore unloaded over a 3 year period. The record proves that high output with low upkeep is yours when you select EC&M Control.

8051

Write today for Bulletin 921-OU



THE ELECTRIC CONTROLLER & MFG. CO. 2698 E. 79th Street • Cleveland 4, Ohio

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COURT DECISIONS — a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

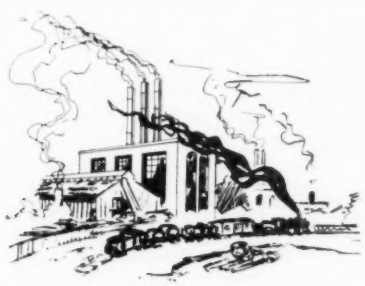
Smoke Ordinance Valid

An ordinance of Weehawken, New Jersey, condemned as a nuisance the emission of smoke of greater than a prescribed density. The New York Central Railroad was charged with a violation of this ordinance in the discharge of smoke from its power plant in that city and from the conviction of the railroad in a local court an appeal was taken to the Supreme Court of the state.

The railroad insisted in its defense that an ordinance of this character applied to a railroad was beyond the city's power to adopt and rested its argument on earlier decisions holding that, "The non-negligent emission of smoke from the smoke stacks of locomotives used in the operation of a railroad is an irremediable incident in the exercise of their franchise and not within local control."

Applying this accepted rule of law to this incident the railroad contended that this ordinance was inapplicable to this power house.

"We do not perceive the analogy," said the New Jersey appellate court. "Quite different considerations govern the use of locomotives in the operation of a railroad and the management of



a local power plant such as we have here. It is beyond the local province to prescribe smoke in the operation of locomotives under a railroad charter unless its escape be attributable to negligence or want of care. There cannot be in the nature of things a delegation of the regulative power which in its varying local applications would render functioning under the state's charter impracticable. The principle has no bearing upon the function of terminal facilities and fixed installations such as engine houses and repair shops."

In its defense to these charges the railroad contended further that a restriction of this character had no substantial relation to the public health and that only for such a purpose was this city's board of health empowered by the legislature to adopt an ordinance of this character.

"The local boards of health were created to prevent nuisances in the conservation of the public health and to prevent disease and discomfort such as might arise from the contamination of air, water or food," said the court in overruling this contention.

"At common law an action of nuisance will lie for substantial discomfort or inconvenience. But the inconvenience must be more than fanciful; it is not actionable unless it is one materially interfering with the ordinary comfort of human existence, not merely according to elegant or dainty modes and habits of living, but according to plain, sober and simple notions. The common law judges by no Spartan standards. The loss of even one night's sleep is not deemed a trivial matter."

Grain Mill Operation Legal

Plans had been perfected, land acquired and $8,000 spent for material and equipment for the construction of a grain mill in North Carolina. On an adjacent lot a cotton gin had been operated for several years and nearby was a blacksmith shop.

An ordinance had been adopted by the village, "That no more gins or mills be erected in the corporate limits of the town without the consent of all property owners within 300 ft of the proposed site of the building."

Shortly after the adoption of this ordinance suit was brought to prohibit the construction of this mill, in which it was said, "The proposed mill when completed and in operation will injuriously affect the owners of adjacent residences by loud noises and the discharge of dust from milling operations; that these disturbances would injuriously affect the health, comfort and pleasure of these residents and that the maintenance of the mill would cause irreparable damage to the enjoyment of the surrounding property."

The Supreme Court of that state, refusing to interfere, said of the ordinance involved in this controversy,

"The ordinance purports to prohibit the erection of a gin or mill in the town without the consent of neighboring property owners. Where the effectiveness of the ordinance determining the use of property for a lawful purpose is conditioned upon the assent or permission of private persons, such as the owners of adjacent property, it must be held invalid as it involves the delegation of legislative power to private individuals."

Then of the contention that the conduct of the mill would or might become a nuisance the court added,

"That is a nuisance which annoys or disturbs one in the possession of his property rendering its ordinary use or occupation physically uncomfortable to him. For such annoyance and discomfort the courts of law will afford redress by giving damages against the wrongdoer and when the cause of the annoyance and discomfort is continuous courts will interfere and restrain the nuisance.

"The general rule is that when the owner of property is about to engage in a business enterprise which may or may not become a nuisance according to the manner in which it may be conducted, courts will usually not interfere to restrain such an undertaking, especially when the apprehended injury is doubtful or contingent.

"This is true when the business may become of some benefit to the community and the injury threatened relates to the comfort and convenience of those complaining rather than such as imports serious injury to health or property rights."

Acceptance Of Defective Dies

Purchase contract with a California die manufacturer as seller, was in part: "Upon the terms and conditions herein contained we agree to purchase from you the following described property. One 4-cavity die to make covers for Styrene Box as per drawings furnished: one 4-cavity die to make bases for Styrene Box as per drawings furnished. Contract price $5,250. Terms of payment $2,500 down, final payment after approval of samples and dies by purchaser."

The dies were delivered within the allotted time, samples were run and the dies were found defective. The dies were returned, reworked and again found defective. Not only would they not make the box and cover as specified but failed to conform to drawings.

The purchaser then notified the die manufacturer that these dies were being sent elsewhere for correction and that the die manufacturer would be held liable for the damage and expense. The die manufacturer sued for the recovery of the balance unpaid

COURT DECISIONS

under this agreement to which the purchaser set up in its defense a counterclaim for its damages.

The law embodied in a California statute and now generally adopted throughout the country is,

"In the absence of express or implied agreements of the parties, acceptance of the goods by the buyer will not discharge the seller from liability for damages or other legal remedy or from breach of any promise or warranty in the contract to sell or the sale. But if, after acceptance of the goods the buyer fails to give notice to the seller of the breach of any promise or warranty within a reasonable time after the buyer knows or ought to know of such breach, the seller shall not be liable therefor."

In the lower court the purchaser recovered $9,203.09 as his damages and the manufacturer appealed, contending that the purpose of the requirement for notice by the statute was that the manufacturer or seller should have a reasonable time within which to make corrections.

The appellate court in affirming the judgment against the die manufacturer, said, "The purpose of the notice is to advise the seller that he must meet a claim for damages as to which, rightly or wrongly, the law requires that he should have real warning.

"This section of the statute amounts to this, that the seller's tender of the goods is treated as an offer of them in full satisfaction but the buyer is allowed a reasonable time for accepting the offer. Moreover if he declines to take the goods in full satisfaction he need not return them. The practical advantages of the statutory rule and its ease and certainty of application, commend it."

Parking Lot Responsibility

An open lot in Mobile, Alabama, owned by a utility company and adjacent to a ball park, was used by both the utility employees and the patrons of the ball park. An employee of the utility company had been assigned to the lot to collect from the public a fee of fifteen cents for each parking. A car owner attending a baseball game left his car in the lot. The car was stolen and he sued the utility company for the value of the car, contending that the company was negligent in its care of his property.

The Supreme Court of that state, holding that no liability rested on the utility company for the loss of this car, said, "No question arises as to the legal duty growing out of a public service such as a public warehouse and the like. The liability must rest either upon a direct contract, express or implied, or upon a duty growing out of the relations created by such contract.

"Within itself a parking space in common understanding implies a place

where cars may be driven by the owners, left parked or standing and removed by the owner at pleasure. A fee charged for a parking privilege in a place may be regarded as carrying the right to parking space with rights of ingress and egress.

"The check issued to this car owner may be considered in the nature of a receipt although it does not acknowledge receipt of the fifteen cents. On its face it is more than a receipt. It expressly defines the service or right sold for fifteen cents, 'The privilege of parking one automobile in the Monroe parking space.' It also embodies an express notice that, 'The company assumes no responsibility for lost or stolen property.'

"There is no contract carrying a duty to keep a general lookout for thieves. The general watch over parked cars may be referred to the duty to make available the right of parking space with ingress and egress —a privilege for which the owner paid his entrance fee.

"To write into the transaction a duty to look out for theft is to add to the specially limited service the parties had in mind and to impose a liability properly covered by the field of insurance. It would defeat the purpose to furnish a mere parking convenience for a nominal charge."

Fumes from Dye Works

Property owners in a Pennsylvania city applied to a court of that state for an injunction prohibiting the discharge of black smoke, soot and fumes from a nearby dye plant. The houses and their contents were covered with soot and at night the loud and continuous noise from the plant interfered with sleep.

In its defense to this action the owners of the plant insisted that the neighborhood was a manufacturing district and that the smoke and noise were an unavoidable incident to this industrial operation.

The lower court in its decision against the owners of this plant, that was later set aside on appeal, said that these owners operated the furnaces so that there were discharged from the stacks a heavy black soot, smoke and offensive odors and gases which these residents were forced to inhale; that the machinery and mechanical appliances caused loud and continuous noises consisting of grinding metal and the shrill escape of steam disturbed the sleep of these residents and destroyed the enjoyment of their comfort and in other ways injured and annoyed their peace and welfare.

The plant owners appealed, contending that they had adopted all the reasonable and available devices to minimize the cause for these complaints and that there was no other method for eliminating such condition.

In setting aside the decree of the lower court and reversing the judgment against the owners of this plant, the appellate court said,

"The courts have found it difficult to lay down any precise and inflexible rule by the application of which it can be determined that a person disturbed by operations of this character is entitled to relief against smoke, fumes and noises emitted in the vicinity of his residence. It has been said that whether the use is reasonable generally depends upon many and varied facts. No hard and fast rule controls the subject. The use that would be reasonable under one set of facts might be unreasonable under another.

"The prosperity of an industrial community depends on its industrial activities and it would be inconsistent with sound public policy to prohibit these activities at the behest of a comparative few who are annoyed thereby.

"Every form of industrial activity has its disagreeable factors. Industries like individuals have the defects of their qualities.

In almost all mining and manufacturing communities people must expect that their homes will be more difficult to keep clean than if they lived in an agricultural community. A certain amount of noise also is inseparable from industrial activity. The burdens of prosperity must be taken with its benefits."

1879-1954 DIAMOND JUBILEE OF THE FIRST INCANDESCENT LIGHT

Oil for Edison's Magic Lamp_

and for the Power Plants that Light America's Cities Today!

SEVENTY-FIVE years ago, when the incandescent lamp was born, Thomas Edison relied on a Socony-Vacuum oil to protect the generating equipment that provided the electricity. Today, to commemorate the diamond jubilee of light, Edison's original equipment has been re-activated at the Henry Ford Museum and Greenfield Village near Detroit. And once again a Socony-Vacuum Oil has been chosen to protect it.

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No costly maintenance problem here

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For maintenance-free exterior walls and roofs, plus protection from fire, rot and weather

YOU SAVE MONEY on construction and maintenance when you build with Johns-Manville Corrugated Transite®. Corrugated Transite comes in large sheets that require a minimum of framing . . . permits fast economical construction of maintenance-free industrial, commercial, institutional and agricultural buildings.

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Investigate Johns-Manville Corrugated Asbestos Transite and learn how you can build quickly and easily . . . have an attractive, long-lasting, trouble-free structure regardless of size or purpose. For complete details write Johns-Manville, Box 158, Dept. FM, New York 16, New York. In Canada write 199 Bay St., Toronto, Ontario.

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Numerous advantages like:

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quick heating
steady temperatures
stainless steel construction
one moving part
non-freezing
low cost

More than 900,000 used throughout industry.

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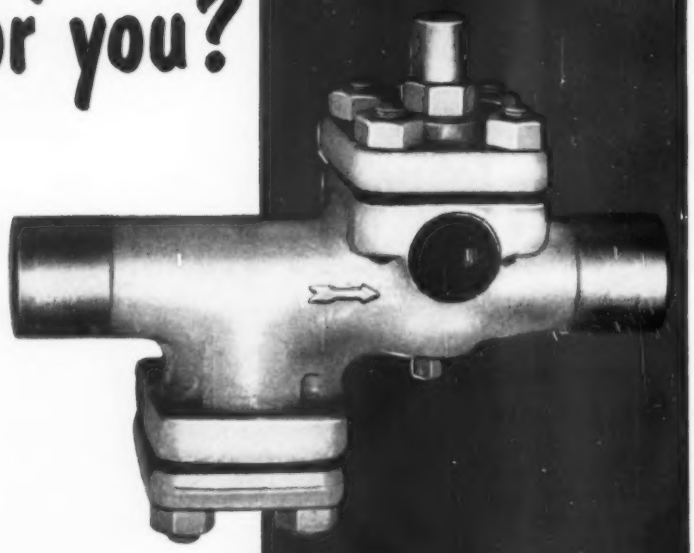

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After actual torque of shaft is determined with strain gage, the torque plus the known shaft speed results in a true horsepower reading

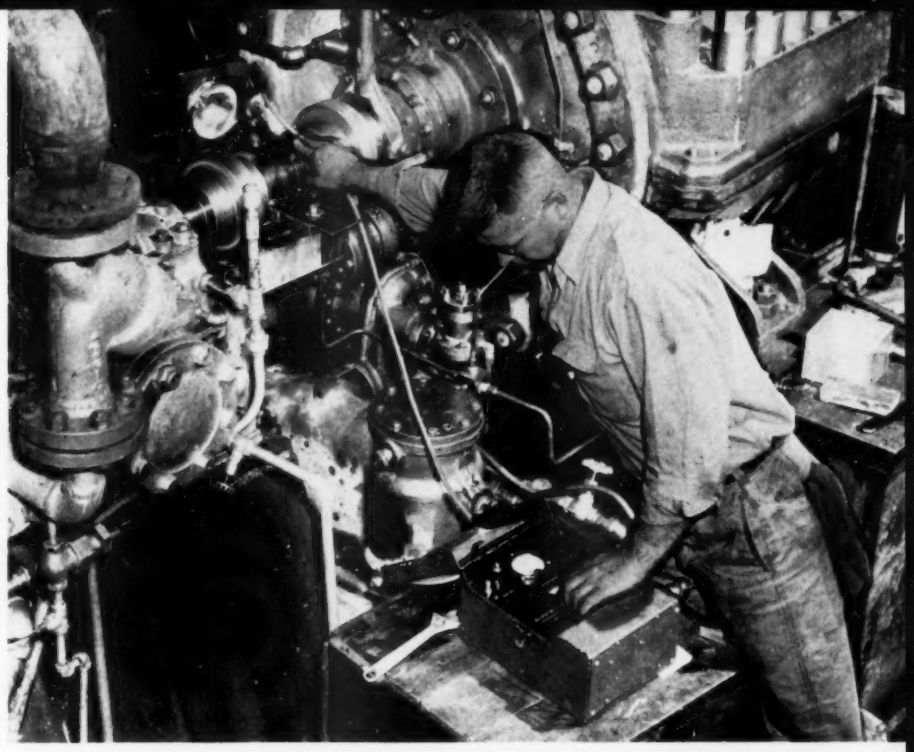


Fig. 1. Test engineer shown taking the horsepower reading on a high speed centri ugal pump

How Strain Gages are Used For Measuring Shaft Horsepower

By DANIEL NOBLES, Worthington, Corp., Harrison, N. J.

SHAFT HORSEPOWER can be measured by various techniques depending on the type of driver used. The fly in the ointment is that certain drivers need special equipment to make this determination.

A direct method for shaft horsepower determination has recently been developed. By this method the actual torque on the shaft is determined. This torque combined with the shaft speed results in true horsepower readings which are not dependent on driver conditions, electrical, mechanical, or otherwise.

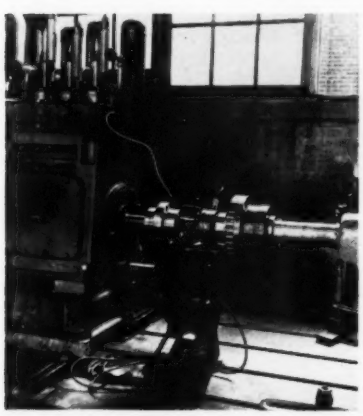


Fig. 2. Equipment measures horsepower input in this reciprocating power pump

The bonded wire strain gage is the basic element in the equipment needed for this method. By using four such gages of paper clip size, the surface strains on the shaft are accurately measured at speeds up to 250 revolutions per second.

These tiny gages are bonded to the shaft surface in a four arm Wheatstone Bridge circuit. This is done in such a way that the gages can sense or "feel" the tension and compression strains caused by twisting forces. The arrangement is designed to cancel out temperature change and bending stress effects as well as all other forces other than torsion so that while the device is highly sensitive to twisting strains, it is insensitive to all else.

What's more, this same size gage can be used on shafts from as small as one-half inch diameter up to massive shafts 20 in. or more in diameter such as those used to transmit thousands of horsepower in most ocean going ships.

The basic theorem which makes this device possible is that resistance of a wire varies inversely with its diameter. The bonded wire strain gage utilizes a very fine wire grid which when mounted flat on a stressed surface, will vary in length and diameter according to the strains that surface undergoes. It isn't quite that simple in practice, but the basic theory suffices here.

Special meters are needed to indicate the minute strain gage reactions. It is obvious that these instruments must have high sensitivity and stability considering that a full load on the shaft will cause each gage to change its actual length by a mere one-tenth of a percent, or one thousandth of an inch for a one inch strain gage.

The Wheatstone bridge circuit is very useful in this respect because its four gage arrangement can add the signals giving an output four times as great as from one gage alone. The circuit requires two gages to be in compression while the other two are in tension. Otherwise, the signals from the four gages strained in the same direction would cancel each other

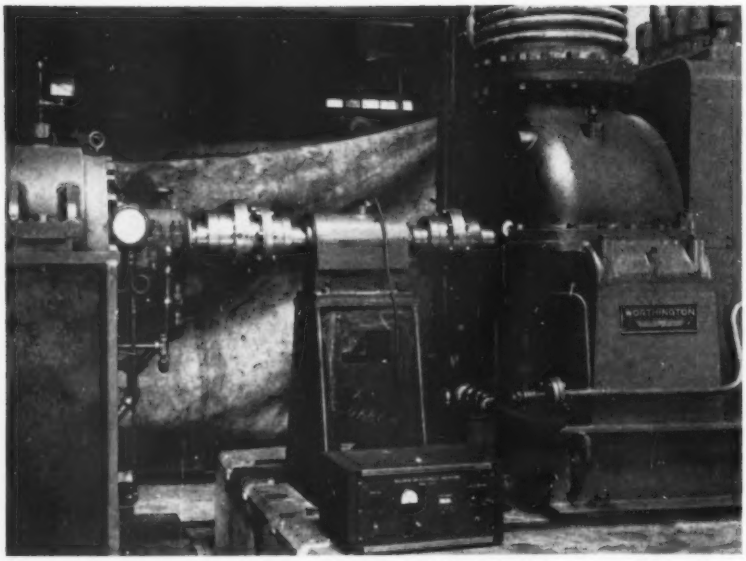


Fig. 3. This 4000 ft-lb torque measuring equipment tests boiler feed pumps

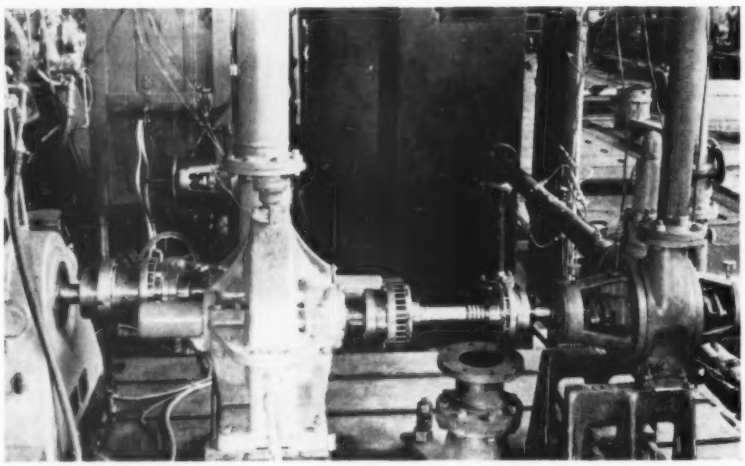


Fig. 4. Vane pump undergoes performance test using torque shaft instrumentation

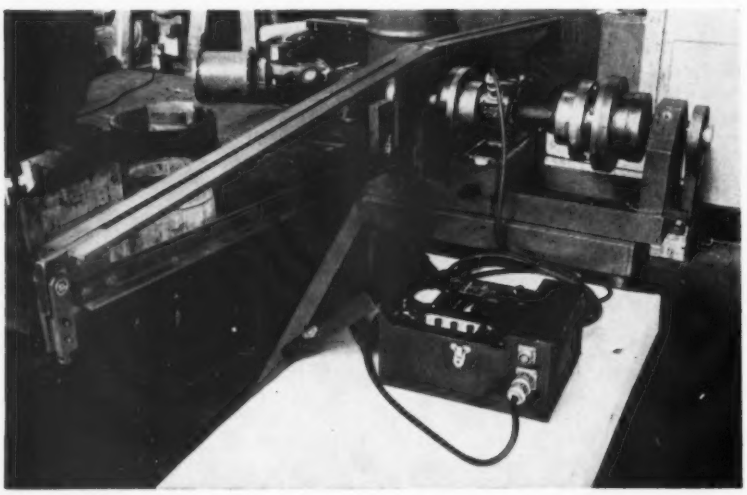


Fig. 5. This calibration stand is used to check accuracy of torque shaft rating

giving an output of zero. Actually, this last characteristic is very useful, and is the basis for compensating in the gages themselves for bending and axial strains.

The shaft with electrically interconnected strain gages mounted on it must be provided with slip rings and brushes to transmit the electric currents to and from the rotating bridge circuit. The resistance changes in the bridge are measured on an instrument connected to the shaft apparatus by a cable. These readings can usually be taken as far as 25 ft from the shaft.

Torque shafts, indicating instruments, and accessories covering six ranges from 100 to 3200 ft-lb are used in our Research and Development Department for a great variety of applications. Development work was performed on single stage boiler feed pumps with torque shafts rated at 350 and 500 ft-lb. But when six and eight stage barrel type boiler feed pumps were brought in for full speed performance testing, efficiencies were measured with the 3200 ft-lb equipment.

Centrifugal Compressors

Power measurement for performance tests on equipment such as high speed centrifugal compressors are tricky because speeds are high and a true running torque shaft is a must for smooth vibrationless operation. These shafts are mounted with flexible self-aligning geared couplings and close lineup work is required in all but the slowest running machinery.

Rotary pump rating tests have been conducted with a torque shaft installed between the pump and the slow speed shaft of a step-down gear box: in this way we eliminate consideration of any losses in both the gear box and the d-c motor drive. Tests set up in this manner on a new model vertical triplex pump driven directly by a d-c motor were performed at speeds up to 450 rpm.

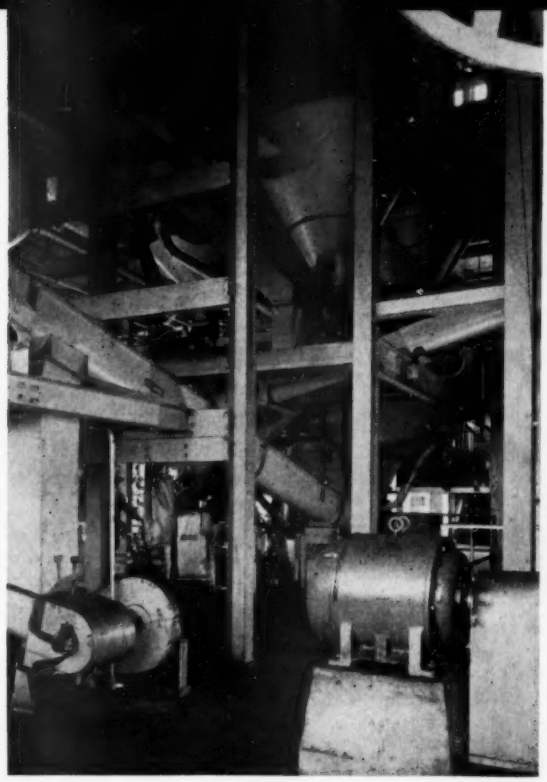
Calibration of these torque shafts is checked periodically on a static test stand where a shaft can be supported on bearings and loaded with a known static torque through an overhanging lever arm. Calibrations are made in both directions of twist, and they are generally found to agree within a small fraction of a per cent, for a particular shaft.

The largest shaft, 4000 ft-lb, is calibrated by hanging 800 lb of dead weight at the end of a five foot torque arm.

This torque measuring equipment gives great versatility to the testing facilities of a laboratory, allowing much more freedom in the selection of driving motors or turbines.

Dust-Free Conveying System in Coal Products Plant

Completely automatic processing and materials handling system, plus interlocking automatic controls and explosion-proof equipment are features of this new plant



View of screw conveyor to storage bin and motors for pitch pulverizer. All screw conveyor drives are dust tight

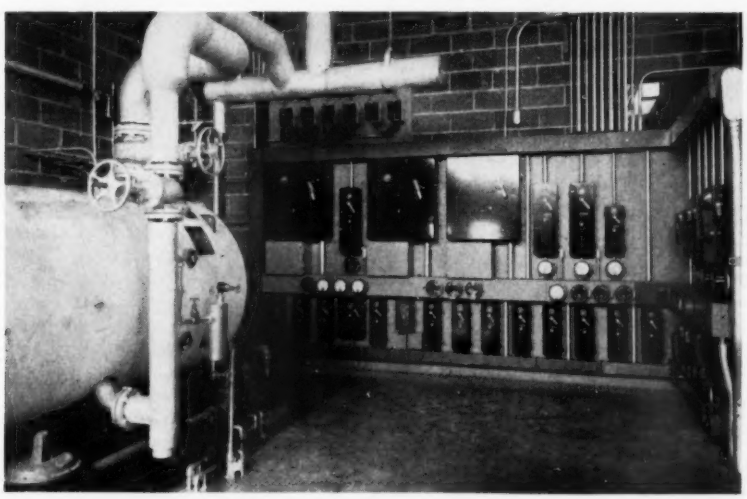
THERE IS AN inkling of dust-free conditions to come in the foundry industry and the rapidly expanding field of coal chemistry in a little box-like factory building down on the Monongahela River at West Elizabeth, Penna. It houses one of the most concentrated and completely automatic installations of materials handling and processing equipment ever packed into an area of comparable size.

This plant, recently placed in operation by Penn-Rillton Co., which processes lump coal and coal tar pitch into fine pulverized foundry mold facing and core binder materials, sets new standards in dust control and dust collection. With an intricate maze of pulverizing, conveying and blending equipment and two 100-ton storage silos concentrated in 2,400 sq ft of floor space which has an initial daily processing capacity of 140 tons of bagged and finished products, there is plenty of room for expansion in the 7,400 sq ft manufacturing area.

Foolproof interlocking automatic controls, explosion-proof motors and electrical equipment, and an all-inclusive dust control and collection system have been provided by The Austin Company, which designed the plant and processing installation in the interests of efficiency, economy and safety, as well as working conditions.

Lump coal and dry coal tar pitch are the principal raw materials required by the plant. These are received by rail from nearby mines and unloaded directly into the car hopper on the north side of the building. They travel on a belt conveyor to a single roll crusher, then are carried up to the top of the building by a bucket elevator. Passing through screw conveyors, the coal and pitch are delivered to their respective storage silos, of 100-ton capacity. Thence they pass through any of a number of combinations of pulverizers, screens, separators and other equipment, and are reduced to 200 mesh or finer before they arrive at bagging machines on the main floor. Bags of finished products then move to the warehouse area, on the east side of the plant, to await shipment.

Centralized and interlocking electric motor controls and metering equipment. Boiler room location obviated need for explosion-proof equipment, also cut costs



Combinations of equipment through which the materials pass are regulated according to the composition and grain sizes desired in the finished products. The coal and pitch are sometimes combined, in a number of proportions. In addition, various other substances, including goulac, clay and dextrine, are mixed with the pitch to produce core binders with special properties.

Because of the nature of the raw materials and products processed in the plant, a highly efficient dust collecting system was necessary. Yet the mass of equipment installed occupies remarkably little floor space and the plant as now constructed provides room for considerable expansion of processing facilities in the future. The structure was so located that it may

(Continued on page 193)

ROTARY PUMPS
Types and Applications...Part I

In the application of rotary pumps certain factors must be considered to insure a successful installation . . . Author discusses the six basic types of rotary pumps and also mentions other aids to check for the proper application

By W. J. MONGON, De Laval Steam Turbine Co., Trenton, N. J.

ROTARY PUMPS, combining the rotary motion of the centrifugal pump with the positive pressure characteristics of the reciprocating pump, are playing an important role in moving liquid materials through the pipelines of industry. A description of the various types of rotary pumps appears below.

However, before we discuss these pumps it might be well to review the three basic types of pumps: the centrifugal, the reciprocating and the rotary.

The centrifugal pump develops its pressure as a result of centrifugal force. It has constant delivery characteristics and is mostly used where large volumes at relatively low pressure are required. Pumps of this type operate at comparatively high speed, usually direct-connected to their driver. They are not, however, self-priming except in the case of some very special designs, and the delivered capacity will vary considerably with any change in discharge pressure.

Centrifugal pumps are not particularly adapted to handling viscous fluids. They are, however, occasionally used for fluid handling applications, but the efficiency usually drops off quite rapidly if viscosities above 500 to 1000 SSU are encountered.

The reciprocating pump has positive pressure characteristics and is used principally to handle small volumes at relatively high pressures. Due to its reciprocating motion and the inertia effect of these parts, speeds are relatively low. This type of pump is self-priming and the delivered capacity is practically constant regardless of discharge pressure. It can handle practically all types of fluids with uniformly high volumetric efficiency.

The rotary pump, combines the rotary motion of the centrifugal with the positive pressure characteristics of the reciprocating pump. Like the reciprocating pump it is a positive displacement device that delivers a given quantity of fluid with each revolution. It is self-priming and gives practically constant delivered capacity regardless of pressure.

Its range of speeds is much higher than is usual for reciprocating pumps, which permits a direct-connected motor drive in most cases. Its greatest use is in handling viscous fluids, but it will pump practically any fluid that will flow. It is for these reasons and the fact that it is keeping the pipelines of many processes full, which would otherwise be unable to function, that the rotary pump is known as the "workhorse of industry."

A rotary pump consists of a fixed casing containing gears, cams, screws, plungers or similar elements actuated by rotation of the drive shaft.

Types of Rotary Pumps

There are six basic types of pumps in this classification. The gear, vane, screw, cam and piston, shuttle block, and multiple piston types.

The gear type, which is the most common, consists of the external gear including spur, helical and herringbone teeth, the lobular or impeller type and the internal gear. Depending on the design and service, gear type pumps may be furnished either with or without timing gears. All have constant displacement characteristics. Several gear type pumps are illustrated in Figs. 1, 2 and 3.

Vane pumps consist essentially of the sliding and the swinging, or bucket vane type. Although the majority are designed for constant displacement, there are designs available in the sliding vane type by which the displacement, and hence the capacity, can be varied while running at constant speed. This is accomplished by incorporating a device that governs the amount of vane movement. See Figs. 5 and 6.

Screw pumps may have one, two, or three rotors with threads of various contours, depending on the design. Figures 6, 7 and 8 illustrate three screw-type pumps. The majority of two-rotor pumps require timing gears whereas the other types do not. All are of the constant displacement type.

The cam and piston type, Fig. 9, combines the rotary motion of a cam in combination with a piston. Usually two sets are utilized 180 deg apart so that a fairly steady flow results. This type of pump is particularly applicable on high vacuum service.

Shuttle block pump is essentially a piston type pump. It contains a slotted rotor with a pin set eccentric to it in such a manner that it will cause the pistons to move in and out as the rotor is turned. By varying the position of the pin, differences in stroke can be obtained and as a result, variable displacement. This pump is shown in Fig. 10.

Multiple piston pumps, Figs. 11 and 12, may be of the radial or axial type. In either, a series of pistons is actuated by a rotor mounted off center in the casing. Pumps of this type have very high volumetric efficiencies and are often used in the hydraulic field. They are particularly well suited where variable displacement is desired.

The pumping action of all rotary pumps is essentially the same. As the pumping elements are rotated they open on the inlet side, creating a void. The fluid, forced by atmospheric pressure flows in to fill this space. The continued turning of the rotors encloses the fluid between the rotating parts themselves, or between these parts and the pump casing. The rotating parts, at this point are under inlet pressure and continue so until the enclosed portions open into the outlet chamber.

Since the pump is a positive displacement device it is apparent that, with every revolution of the shaft, a definite quantity of fluid passes

(Continued on page 200)

This is the first part of a two part article. The first article deals with the various types of rotary pumps. Part II, to appear in a forthcoming issue, will discuss the factors to consider when selecting a rotary pump for a particular operation.

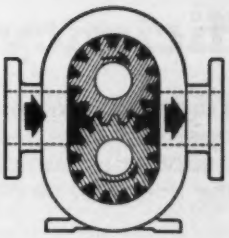


FIG 1 - EXTERNAL GEAR PUMP

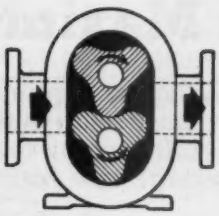


FIG 2 - THREE LOBE PUMP

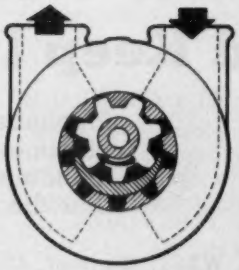


FIG 3 - INTERNAL GEAR PUMP

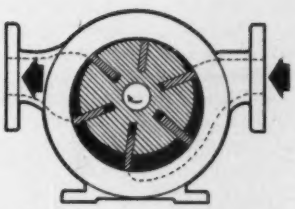


FIG 4 - SLIDING VANE PUMP

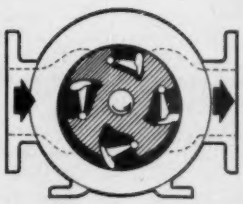


FIG 5 - SWINGING VANE PUMP

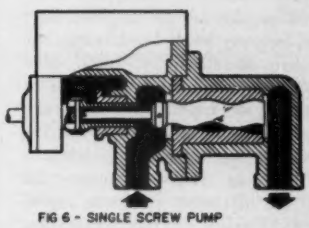


FIG 6 - SINGLE SCREW PUMP

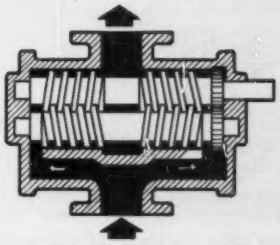


FIG 7 - TWO SCREW PUMP

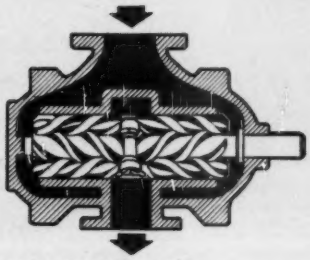


FIG 8 - THREE SCREW PUMP

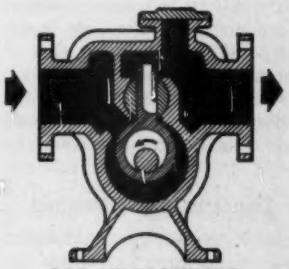


FIG 9 - CAM AND PISTON PUMP

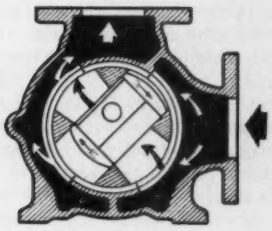


FIG 10 - SHUTTLE BLOCK PUMP

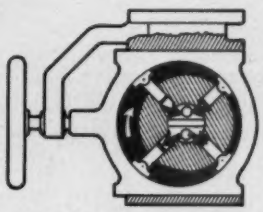


FIG 11 - RADIAL PLUNGER PUMP

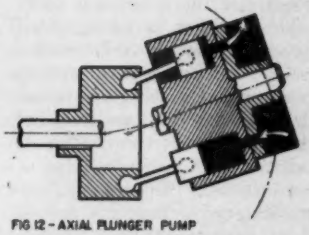


FIG 12 - AXIAL PLUNGER PUMP

How to Clean Industrial Piping — And Keep It at Maximum Efficiency

Pipelines are essential for carrying the liquid of industry... When these pipelines are not functioning at full capacity, operations are necessarily hampered ... Although no one method will serve all situations, author discusses several case histories on how the lines can be cleaned

By L. E. WEST, Engineer, Dowell Inc.

EVERY INDUSTRY must solve the problem of efficiently transferring liquids from one location to another within a manufacturing plant. Sometimes a veritable maze of pipelines is required for this purpose. This is a problem in design engineering; however, keeping such lines operating with maximum efficiency, often presents an equally difficult problem. The deposition of dissolved minerals, corrosion products or insoluble particles results in partial blocking, with resultant loss in flow capacity. In addition, the attendant pressure losses experienced result in increasing the cost of transportation of the fluids.

In product lines, a slow build-up of deposits may be caused, either by sedimentation from the fluid going through the line, or by corrosive action of the product upon the pipe itself. In water lines, the problem is that of the natural corrosiveness of the water and its resultant action upon the line, combined with the build-up of minerals deposited in insoluble form from the water.

How Deposits Are Classified

In general, the deposits laid down in water-carrying lines in various industrial applications, may be classified as carbonates, silicates, sulphates, phosphates, and different forms of iron oxides, alone or in combination. Deposits occurring in product lines cover a much greater range, their exact nature depending on the product being transported and the conditions under which the deposition is taking place. Such product lines not only include systems for transporting process fluids from one section of the plant to another, but also product lines from one plant to another or from plant to consumer.

When installed, plant piping systems are designed to handle a definite and given amount of fluid, over a definite period of time, at certain pumping pressures. Through usage, these lines build up accumulations of deposits causing increased pressure drops. This results in a decrease in through-put capacity in the case of product lines, or a shortage of water being used as a cooling medium, or for some other purpose. As a result, management is faced with the problem of either installing additional lines or cleaning existing ones if the plant is to operate at top efficiency.

This problem has been greatly simplified during recent years by the development of effective chemical cleaning procedures. The application of various types of chemical solvents, using auxiliary mechanical aids where necessary, has been successfully utilized for the removal of practically all kinds of deposits from many different types of lines and plant equipment. Such cleaning methods are conducted with the lines in place, eliminating the need for dismantling or long, costly shutdowns. Thus, the plant engineer is provided with a solution to his line cleaning problems that is fast, effective and economical.

While it is possible for a manufacturing plant to conduct its own chemical cleaning operations, it is usually more practicall to employ a chemical cleaning service company that is already equipped for the job. Also there is a high degree of know-how involved, not only in the selection of the proper solvent, but in determining the most effective method of application.

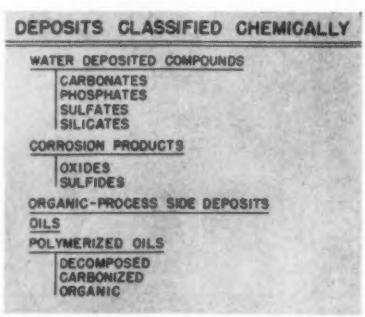


Fig. 1. General classification of the different types of deposits which may be encountered when cleaning pipelines

The first step in chemical cleaning is a preliminary examination of the line or lines to be cleaned. The extent of corrosion and deposition which has taken place is determined, as well as the general physical nature of the deposit itself. Samples are taken for laboratory analysis. At the same time, a thorough examination of the line itself is made to determine its probable life following cleaning. Locations are chosen for vents, to release any gases evolved during the reaction between the deposit and the chemical solvent. Inlet and outlet connections are designated and any other necessary preliminary preparations made. Such vents and connections are usually readily made through regular valves and connections present in the lines.

Sample Deposit Is Analyzed

The sample of deposit or scale, meanwhile, is taken to the laboratory where X-ray and spectrographic analyses are run, as well as solubility determinations in various types of chemical solvents. On the basis of these tests, the choice of solvent formulation is made, together with recommendations regarding the optimum treating procedures for most efficient cleaning of the line. This will of course, depend largely on the chemical and physical make-up of the scale or deposit. A general classification of the different types of deposits encountered in industrial lines are listed in Fig. 1.

On the basis of the laboratory recommendations, the engineer in charge can plan and conduct the chemical cleaning treatment most rapidly and efficiently. This includes preparation of the solvents, conveyance of such to the job, and their proper application. Specialized transport and pumping equipment, such as that shown in Fig. 2, greatly facilitate the handling of the chemical solvents.

Naturally, the exact cleaning procedure used will depend on the specific problem involved. In general, however, the process consists of application of the solvent to the deposit, draining and rinsing following completion of the deposit removal, neutralizing and passivation of the freshly exposed clean metal surfaces, and finally, inspection and hydrostatic testing, prior to returning the line to service.

This last step is important since in some cases, as the result of severe operational corrosion, deep pits may have formed, completely penetrating the wall of the pipe. When the oxides or other scale materials are removed, leaks develop which must be repaired before returning the line to service.

The foregoing discussion has, of necessity, been highly generalized. A more detailed description of the cleaning procedures involved may be had by the study of actual case histories involving typical pipeline installations in various plants throughout the United States, and how they were chemically cleaned.

For purposes of classification, the various types of line cleaning operations may be sub-divided into four groups: (1) Water lines; (2) product lines; (3) auxiliary lines; and (4) new lines.

Water lines—In most water lines, the mineral depositions are readily soluble and simply filling the line with solvent and allowing it to soak is sufficient to remove the blocking deposits. In other cases, more insoluble constituents, such as silicates, sulphates, or phosphates, require specially formulated solvents and application techniques.

In such cases, the solvent may be continuously or intermittently circulated through the lines, and auxiliary mechanical aids may be employed.

One rather unusual application of water line cleaning was for a mine company in northern Wisconsin. The line was in two sections: 1100 ft of 6 in. pipe from the surface down into the mine, with another line running 800 ft below that, making a total of 1900 ft of vertical line.

Following analysis of samples of the scale, a suitable solvent was prepared and applied by running a hose to the bottom of the 1100 ft section and first filling the lower 800 ft section of line. The hose was then raised and the balance of the line filled.

Following a soaking time of six hours, the company pump at the bottom of the line was started, flushing up from the bottom to the surface. Mine water was used as a flushing media. Pressure loss figures on the line following the flushing operation showed that approximately 85 per cent of the original pumping rate had been restored.

A second stage of solvent was then applied in order to remove the more insoluble silicates and iron, still adhering to the metal. This time a soaking period of 12 hours was allowed. The line was again flushed and pressure loss determinations indicated that the line was now operating with the same efficiency as when newly installed, and was returned to service. The line was not in use for approximately 40 hours during which time only a small portion of one of the mine levels was flooded.

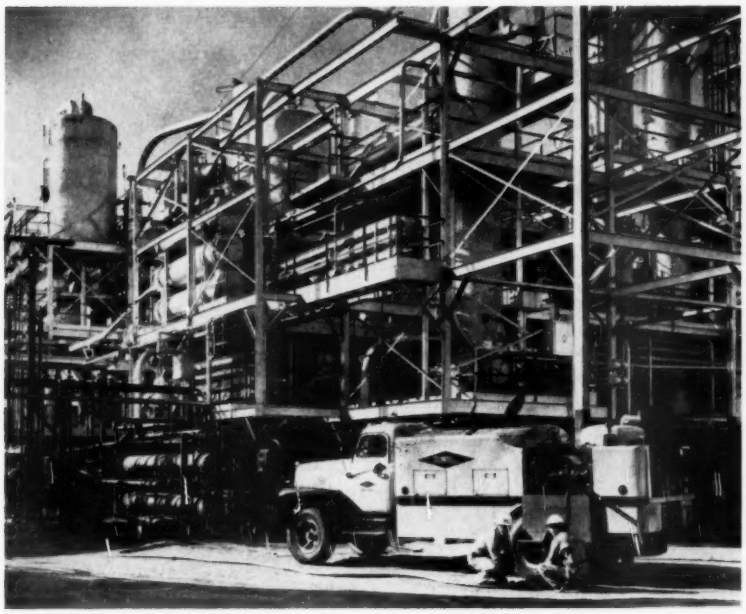


Fig. 2. Specialized transport and pumping equipment, such as that illustrated here, greatly facilitate the handling of chemical solvents for cleaning lines

How Lines Are Cleaned

A fresh water supply line was cleaned for a southern pulp and paper mill. The line originated at the down river pump house and ran both under and above ground to the boiler house. Deposits had greatly decreased the capacity of the line and, even after the installation of a booster pump installed midway in the line, the supply was inadequate for the boilers.

Chemical solvent was introduced at the booster pump, the line being filled to both ends. After an eight hour soaking period, the line was flushed with water from the main pump. The line was found to be completely clean following this treatment.

Another water line cleaning job, where time-out-of-service was an important factor, was performed for one of the major railroads at a midwestern terminus. The line consisted of a 24 in. standpipe from the main water tower, coming off to a 50 ft section of 24 in. main, which in turn branched into three 8 in. feeders, 1500 ft in length, connected to penstocks at various locations in the yard. When originally installed, this line was designed to service a steam locomotive in four minutes at any of the penstocks. However the accumulated scale in the lines had restricted water flow until it required 12½ minutes to service a locomotive. Examination showed that the scale, consisting almost entirely of calcium carbonate, had built up until the inner diameter of the 8 in. line was only 4 in.

Since the line was in continual service except for a three and a half hour period between midnight and 3:30 am, at which time scheduling of trains through the yard was at its lowest point, the chemical cleaning treatment was planned for this slack period.

The solvents were pumped into the line and bled off at each of the penstocks until the discharge showed acidity. At this time the lines were closed in, with a pressure gage on the line to measure the carbon dioxide buildup caused by the reaction between the acid solvent and the calcium carbonate scale. When this pressure reached 425 lb, the main valve of the penstock was opened and the system was allowed to blow itself clear. The lines were refilled with fresh solvent.

After four such stages had been

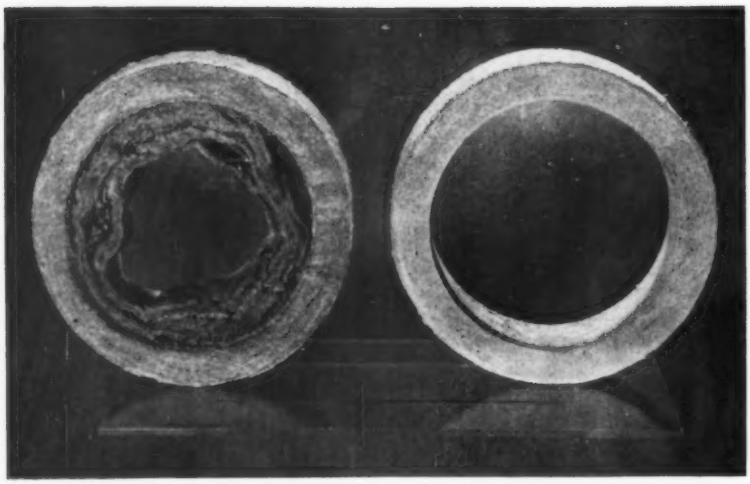


Fig. 3. Section cuts of a pipe line show how it looked before and after the cleaning. The section at left reveals the extent to which this pipe had become obstructed

completed, the main stand-pipe valve and the three penstock valves were opened, allowing a surge of water to wash through from the water tank, flushing the lines thoroughly. This washing out of the lines required about 14 minutes and was considered complete when a test of the water coming out of the discharge at the penstocks was found to have a pH of about 10.3. This was approximately the same as that of the water stored in the tank. The entire job was completed in three hours and 24 minutes, and the lines were returned to service within the three and a half hour time limit specified by the railroad for servicing the lines.

A comparatively recent improvement in treating technique for cleaning water lines has been the introduction of concentrated chemical solvents directly into the water stream. Where the water is not used in the manufacturing process but serves only as a coolant, it is thus possible to conduct the deposit removal treatment without interrupting plant operations. This is frequently important in industries operating at peak capacity, where every maintenance shut-down represents a costly loss in production.

One such example was a line-cleaning operation conducted in a midwestern refinery, where overhead vapor condensers and associated piping in a pipe still, with a design through-put of 72,000 bbl per day had become so fouled with deposits that the capacity was reduced to 63,000 bbl per day. The plant could not be shut down for mechanical cleaning.

The pipe was cleaned chemically, during operation, by injecting concentrated solvent into the cooling stream, over a one-hour period. During this time the water performed its normal cooling function, while the solvent simultaneously dissolved the deposits. The spent solvents, carrying the dissolved and disintegrated material, was discharged to waste. As a result of this treatment, the through-put was increased to 70,000 bbl per day, enabling the plant to remain on stream until the regularly scheduled "turnaround."

These are only four examples of the application of chemical cleaning methods for removing deposits from industrial water lines, rapidly and economically. More and more, these techniques are assuming a definite place in the preventive maintenance programs of chemical, refining, food, pulp and paper, steel and public utility plants.

Cleaning Process Lines

Product lines — In cleaning lines that handle process materials, the engineer is confronted with a great variety of deposits, depending upon the particular manufacturing process involved. As a result, a greater complexity of solvents and treating procedures are required than for water lines.

One major cleaning operation involved removing a ¼ in. thick deposit of iron sulphide from an 85 mile, 4 in. LPG line, used to carry liquid petroleum gases from a refinery to a nearby petrochemical plant.

The line was originally designed to handle 6000 bbl of liquid petroleum gases per day, at approximately 1000 psi input pressure. At the time of the cleaning operation, the capacity of the line had been reduced to 3700 bbl per day, at 1000 psi pressure, curtailing operations in the petrochemical plant.

In addition, pinhole leaks were developed intermittently along the line, requiring frequent shut-downs for repair. By completely cleaning out the scale deposits from the line, it would be possible to locate all leaks and weak spots by means of a hydrostatic test. Following this, all repairs could be conducted at one time, a great savings over the cumulative days of outage required to repair such leaks individually.

After a careful survey of the line, it was decided to clean the entire system in one operation. This was accomplished by pumping 200,000 gal of acid solvent through the line, in five stages, followed by approximately 70,000 gal of fresh water. This in turn, was followed by 300,000 gal of neutralizing solution, containing a surface tension reducing agent. Pumping was continued until causticity was established at the discharge end of the line 85 miles away. The line was then closed and pressure built up to 2500 psi at the input end, for a 24 hour period.

Company engineers then surveyed the line, starting from the outlet end, to establish the location of any leaks that had been revealed by the cleaning operation. Stop valves were provided every 5 miles along the line and as soon as each 5 mile section had been inspected, the stop gate was closed and the next section surveyed. In all, approximately 22 minor leaks were uncovered and repaired.

The stop gates were then opened and a 2200 psi hydrostatic test put on the line, which held the pressure over a 12 hour period. The line was then restored to service and subsequent pumping rate determinations showed that the line would carry 5200 bbl of liquid petroleum gases per day, at an input pressure of 1000 psi. The entire cleaning operation was accomplished in approximately 196 hours, excluding the time spent on subsequent pumping tests, pressure loss determinations, etc., since these were conducted while the line was in operation.

Another refinery cleaning operation consisted of removing 1½ to 2 in. scale from a sour crude line, connecting heat exchangers with the pipe stills. This line consisted of 600 ft of 8 in. diameter, and 300 ft of 6 in. diameter steel pipe. The deposit was an oily polymerized hydrocarbon material, and previous cleaning attempts had proved unsuccessful.

Chemical solvents were jetted in high velocity streams, through a special self-propelling tool attached to a flexible hose. This high pressure "jetmole," traveled through the line, completely removing the deposit through the combined chemical and mechanical action of the solvent. The cleaning

operation was completed in 24 hours.

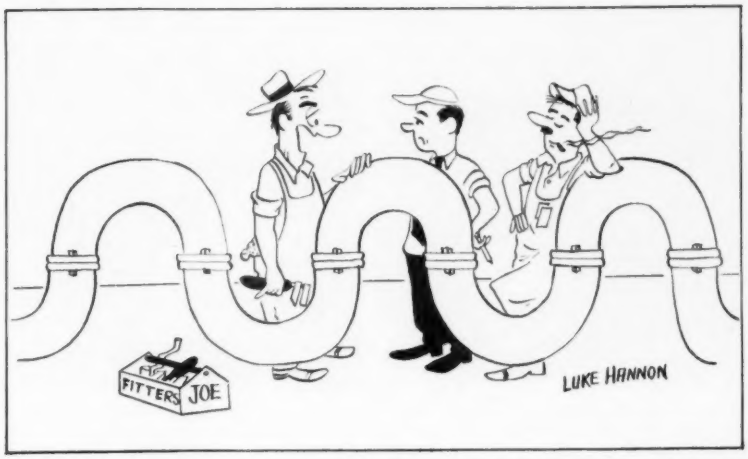
A large Northeastern paper mill found an accumulation, up to two inches in thickness, in 875 ft of an 8 in. line, carrying two per cent pulp slurry. This deposit, consisting of an intermixture of calcium carbonate and pulp fibers, was seriously retarding production. Chemical cleaning restored the line to original capacity in less than 12 hours, thus eliminating this bottleneck.

Removing Copper Deposits

Chemical cleaning has also been utilized to advantage in paper mills for removing deposits from white liquor, green liquor, black liquor and similar product lines carrying process fluids.

A somewhat different cleaning problem was encountered in a plant manufacturing foam rubber. A series of lines, supplying hot, cold and tempering ethylene glycol solutions, had built up an accumulation of copper, iron oxide and other corrosion products. The copper, originally dissolved from various heat exchangers and expansion joints, presented a serious difficulty since constant plating and replating had caused severe corrosion in all lines. Over 7000 ft of 2, 4 and 6 in. lines were chemically cleaned, and the troublesome copper deposits removed, without difficulty, in approximately 60 hours time.

Auxiliary lines — Many lines, removing waste products or by-products, may be considered as auxiliary lines, as differentiated from product lines. These lines, in time, may become partially blocked, reducing their capacity to a point where they interfere with normal efficient plant operation. Chemical cleaning methods have been applied to restore such lines to maximum capacity, in many cases, without interrupting plant operation.



"So we figured—since we had run short of the 20 ft lengths—and had plenty of elbows—"

In an eastern steel mill 400 ft of a nine-foot diameter blast furnace gas main had become badly plugged with deposits of ore dust. This deposit was principally located on the bottom of the line and varied from four to five feet in thickness. In some places, at crossovers from the furnace, the deposit was as much as six feet thick.

This material was cleaned from the line, while it was in operation, in 34 days, a working day averaging six to seven hours. The cleaning procedure was to cut openings into the line at 25 ft intervals. A valve assembly was welded into place at each of these openings containing a lubricator through which a flexible hose could be inserted. Chemical solvents were pumped into the hose at high pressures, approximately 2500 psi, escaping through restricted orifices in a special jet head, fastened to the end of the hose. The resulting high velocity jet stream of solvent impinged on the accumulations in the line, combining a mechanical cutting action with the normal chemical action of the solvent. The design of the jet head is such that the jet streams angle backward, pulling the assembly forward through the line without outside assistance.

Jet Stream Method

By this means, the line was cleaned in 25-ft intervals, the disintegrated deposits being flushed out through dump valves set into the bottom of the line. The remarkable feature about this treatment was that furnace gas, at 40 psi pressure, was passing through the line continuously throughout the cleaning operation. An estimated 600 tons of ore dust was removed from this line without shutting down the furnace or interrupting iron production in any way.

Another example of the benefit of chemical cleaning may be shown by a salt water disposal line running from a heater to a slurry pit. This line was 12,500 ft long, and was made up of 4 and 6 in. asbestos cement pipe. It had become so badly scaled that it would no longer handle the volume of waste brine to be disposed of daily. This line was chemically cleaned for approximately one-fourth of the cost of laying a new line. Figure 3 shows sections cut from the line, before and after cleaning, and reveals the extent to which this pipe had become obstructed.

Particular care had to be exercised during this treatment, both in choosing a solvent and in its application, so as to remove the scale deposit without damaging the asbestos cement

Fig. 4. Steam, water and concentrated solvent are blended to produce a cleaning solution having the proper strength and temperature. Temperature and concentration of solvent being pumped into the line are closely controlled by operator

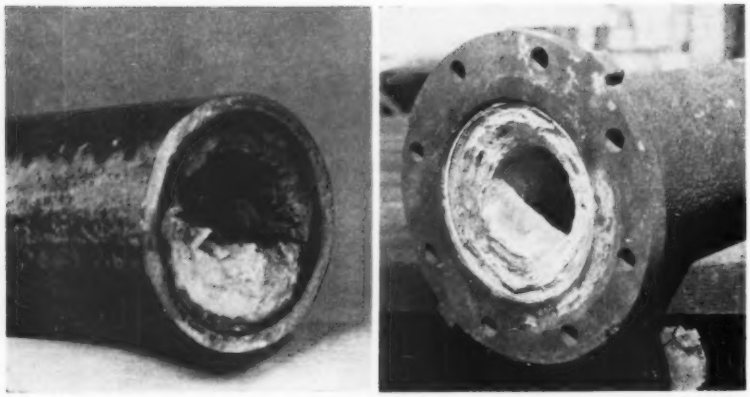


Fig. 5. These illustrations show how deposition can drastically reduce line efficiency. In both cases, the line capacity was less than half the design capacity

pipe. Low pressure centrifugal pumps were used to introduce the solvents, in order to avoid exceeding the pressure limitations of the pipe. The cleaning operation was completed in 26 hours and an estimated 15 tons of scale were removed from the line.

Another type of cleaning operation was performed for a steel mill. In this case, the Dorr Thickener lines had built up deposits until one line was completely plugged. The "jet-mole" method was used on this job to penetrate the packed material and place it in suspension so that it would be washed through the line.

An open cement Dorr trough was cleaned at the same time to remove accumulated deposits on the bottom. In this case, a jet lance was used, projecting a high-velocity stream of fluid that stirred up the deposits sufficiently so that they could be carried downstream with the normal flow.

A midwest refinery experienced difficulty with calcium carbonate scale clogging their sewer line. Calcium chloride, from the driers, was washed to waste every two weeks. There, it reacted with sodium carbonate in the river water flowing through the sewer, resulting in its precipitation. This sewer, consisting of 240 ft of buried 20 in. diam cast iron pipe, was designed to handle 1,300,000 gal of water per day. The scale accumulation had reduced the line to a 4 to 6 in. inner diameter severely reducing capacity.

During the annual plant "turnaround" an attempt was made to clean this line mechanically. However after three weeks, one half the length of the line had been opened up to approximately a 14 in. inner diameter. Since only one week remained of the scheduled shut-down period, chemical cleaning was employed to complete the job. A calculated 392 cu ft of calcium carbonate was removed, restoring the line to full capacity, in six days' time.

New lines—Another application for chemical cleaning which is being increasingly utilized by many different industries, is the removal of mill scale from new lines and equipment. This method is applicable to process lines, lubrication lines, hydraulic lines, oxygen plant lines—in fact, any piping system where particles of unremoved mill scale might flake off during operation of the line, with detrimental consequences. By cleaning such lines after they have been installed in place, the difficulties of handling and assembling pickled or sand-blasted pipe can be avoided. Another application for chemical cleaning is the removal of paint, grease or other preservatives from newly installed lines and equipment.

A typical application on this type is the chemical cleaning of new lines in rolling mill plants after erection. Common practice is to chemically clean, neutralize and passivate the hydraulic lines, lubricating oil systems and Morgoil systems, prior to the start up of the plant.

Cleaning New Piping

Previously, it was customary to circulate a flushing oil through these different pumping systems for several weeks. At the same time, workmen would go from one weld joint to another hammering on the weld seams with the hope that any loose welding flux or other oxides, accumulated around the weld or in the pipe itself, would be dislodged and washed out with the flushing oil.

The cleaning procedure consists of a preliminary stage of degreasing solution, to remove any preservative paints, greases or oils. This is followed by a stage of regular acid solvent, in order to remove residual oxide and flux around welding seams.

After the solvent has had an opportunity to dissolve these undesired iron oxides it is flushed from the lines with hot water until the drained liquid tests neutral. The hot water is then displaced with a passivating solution to prevent after-rusting following the treatment. This passivating solution is circulated until a strainer test indicates that all of the disintegrated particles have been flushed from the line. The passivating solution is then displaced with nitrogen, and the line is dried and filled with the hydraulic fluid or circulating oil that will be carried in the lines during operation.

Fig. 6. Auxiliary mechanical aids, such as this scraper "pig," are frequently employed with the chemical solvents, to remove stubborn or insoluble deposits

Each spring of this matched set of nine in the Ryan installation is capable of absorbing shock of 2800 lb per inch of deflection

Ryan's Floating Islands Hold Up the Presses

FLOATING ISLANDS of concrete form the foundations for two mighty Cecostamps which are the newest additions to Ryan Aeronautical Company's hammer forming department. Consisting of huge concrete blocks, weighing as much as 138,000 pounds, these foundations are cushioned upon sets of coiled steel springs which permit them to "roll with the punch" of the Cecostamps' hammers.

Designed by the Ryan Plant Engineering Department the floating foundations will eliminate the destructive vibration created by the operation of the hammers. Employees will be benefited by insulation from shock and vibration which cause fatigue and discomfort. The life of equipment and buildings, surrounding the area, will be materially extended. The Cecostamps, themselves, will last longer and require less maintenance because of the absence of vibration.

With each blow of their hammers, the new Cecostamps will exert as much as 106,000 lb. In the past, it was considered good practice to mount this type of machine on a wooden wearing surface and bolt it tightly to a fixed concrete foundation. This method permitted the transmission of the damaging vibration, almost undiminished, to all surrounding areas and subjected the machine to heavy shock.

At first glance, it might be thought that the best solution to the problem would be to mount the offending machine upon an elastic material. This is not the case. This method takes away from the efficiency of the machine by reducing the force of impact at the moment of impact. A conception of this phenomenon could be obtained if you tried to pound a nail into a board supported upon sponge rubber. It is necessary to interpose a time lag between the impact and the dispersion of the vibration so that the full force of impact is maintained. This can be accomplished by placing an inertia mass between the anvil of the machine and the elastic insulation.

Ryan plant engineers directed that the Cecostamps be mounted upon huge reinforced concrete blocks which "float" in pits approximately 10 ft deep, 16 ft wide and 22 ft long. These masses momentarily absorb the force of the hammer blows. The huge blocks are suspended upon two rows of Kor-

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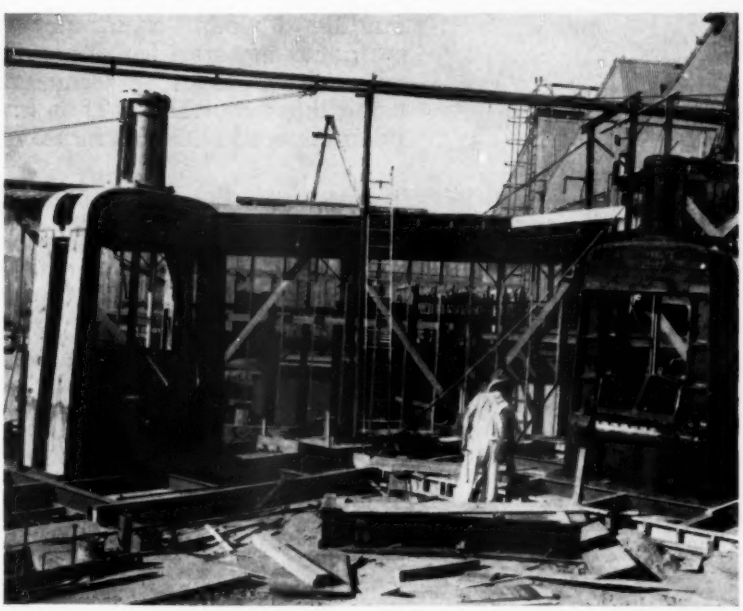
These are the hammers in the course of erection, located upon their floating concrete islands. These big hammers are capable of exerting a 106,000 lb punch



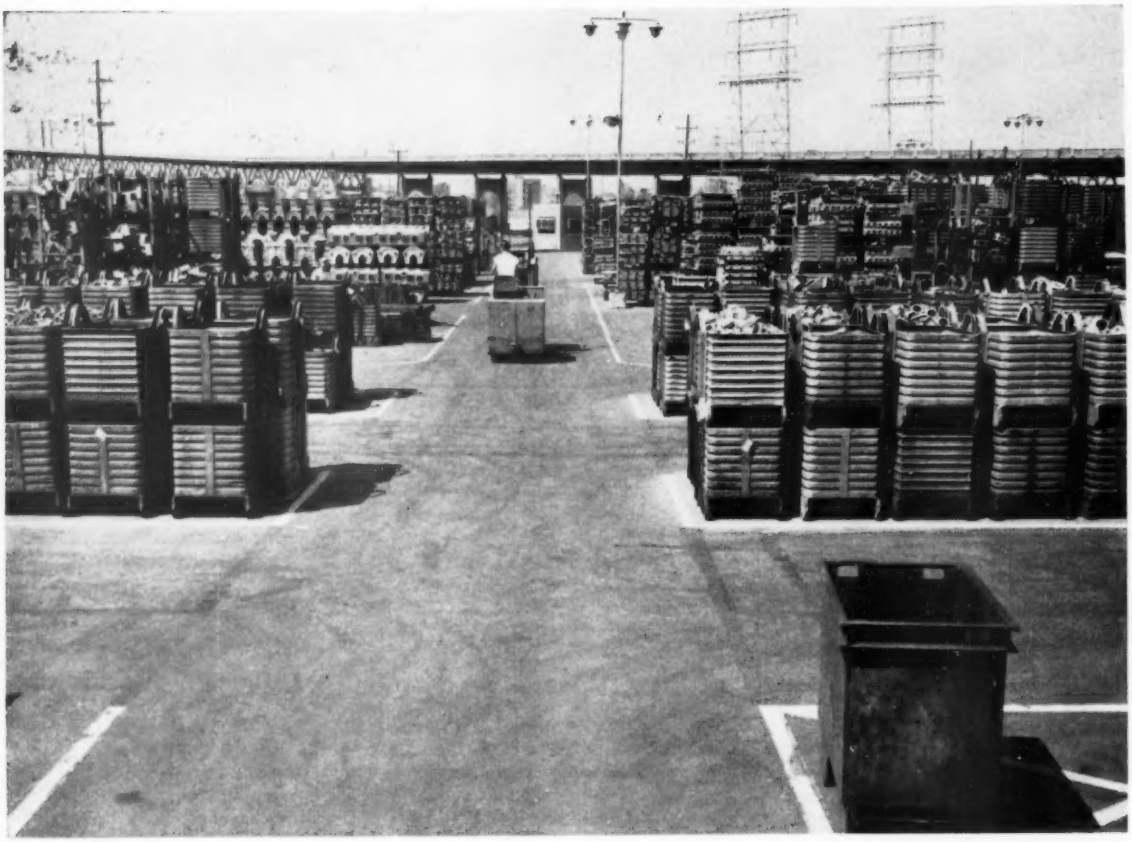


Fig. 1. This view of the storage lot at Building KK, Caterpillar Tractor Co., shows no rutting, scaling or cracking

How Caterpillar Tractor Solves Problems in STORAGE AREA RE-SURFACING

Finding a weight-bearing, practically maintenance-free re-surfacing material for outdoor storage areas was successful when the Company's plant engineering department started using this material . . . Thus far, 690,000 sq ft of surface have been covered with this material; cost: 20 to 30 cents per sq ft

ALTHOUGH THE BUILDINGS of Caterpillar Tractor Co., East Peoria, Ill., have a total floor area of 5,700,000 sq ft, there is still a shortage of storage space for thousands of castings used in its products. To provide this storage space the company had, some years ago, paved with concrete large areas of the open yards adjacent to the buildings where the castings are made.

As time went on, there was an ever-increasing amount of spalling and cracking of the concrete. Very likely the fact that the old concrete was not up to today's standard was a contributing factor to its deterioration.

Small castings are stored in steel tote boxes. These are transported to the yards by fork lift trucks. Many large castings are stored individually, their weight often being more than the filled tote boxes. When ready to use, the castings are transported in the same way to the point of use.

Therefore, one problem confronting the company has been to find some kind of resurfacing for the concrete slabs to overcome the damages caused by poor quality of concrete, by salting to keep ice off in winter, and by spalling.

Caterpillar's engineering department finally found a product to meet its requirement in Permaflex. By its use, the concrete may be resurfaced and continued in use at a fraction of the cost of replacement of the slab.

While Permaflex is not precisely a mastic floor, it has all the advantages of this type of flooring with none of its drawbacks. It is an asphalt emulsion of mineral and chemical ingredients, brown in color, which is used in a mixture of sand, gravel and portland cement. It is best described as a "hard mastic."

Caterpillar's first experience with Permaflex was in 1951, when a test area was selected in the yard of Building HH. The result here warranted a large scale test and in 1952 a total area of 440,000 sq ft was covered in the yards of Buildings HH,

This is the Method Employed

Fig. 2. Workmen using cement mixer for the mastic

Fig. 3. Here they apply a bonding coat of mastic

Fig. 4. Trowel finishing of surface is important

Fig. 5. At right compressed air is used for cleaning

KK, and TT. It proved so satisfactory that in 1953 a contract was let for an additional 250,000 sq ft for the yard of Building LL.

"In all these applications, the work was done during the summer time," says Paul L. Zumwalt, staff engineer in the plant engineering department of Caterpillar, who worked in close cooperation with the manufacturer. "Conditions seem to favor its handling when temperatures are 70 F or more. A good feature is that it doesn't get sticky in hot weather. Under traffic, it will knead."

Preliminary to making the application, the slab was first cleared of all loose and soft concrete and other foreign materials. It was then thoroughly scrubbed, using a Tennant machine and then rinsed thoroughly. A "bond" coat was then applied while the surface was still damp from the rinse water. This "bond" coat was made by diluting the Permaflex with 25 per cent water and applying it with a broom so that one gallon covered 125 sq ft. The bond extended for 3 in. beyond the area to be surfaced. This coat was allowed to dry until tacky and was a deep black in color.

As the slabs are subject to heavy trucking and tremendous weight conditions, a heavy duty mix was used for the second coat, or wearing surface. The various ingredients for this were mixed together in a paddle-type cement mixer, using a 5-gal pail to measure the various ingredients. The formula used was 1 pail of portland cement, 2 pails clean sharp sand, 4 pails hard pea gravel, 1 pail of Permaflex and ¼ pail water.

This mixture was laid to a uniform thickness of ½ in. except in depressions or irregularities in the surface below the general level. It was deposited on the bond coat, leveled off with a straight edge, floated, and trowled the same as a cement surface.

Each 1,000 sq ft of surface required the use of a 55-gal barrel of Permaflex (8 gal for the "bond" coat and 47 gal for the surface coat); 7 bags portland cement; 14 cu ft of clean sharp sand; and 28 cu ft of ¼ in. hard gravel.

Several railroad tracks across the big slabs and approaches to these and to several doors of the plant were then "feathered" out with a light duty mixture made the same way except the gravel was eliminated and an increased amount of sand used.

Surfaces dried rather quickly due to the summer temperature and the good air circulation. The manufacturer prefers to let the surface dry through an entire night before being run over by the trucks, but in cases of necessity, it is possible to cut this time short. The company's track-type tractors are not allowed to run over it at all unless they are provided with street pads.

Where oil, grease, gasoline or kerosene were present, the slabs were coated over the second coat with "Permaflex O," an oil resisting coating.

The manufacturer employed a group of 16 men, mostly local laborers and cement finishers, and including the supervisor. This crew averaged about 10,000 sq ft daily.

"It has been our experience," says Mr. Zumwalt, "that the use of this material has worked out very satisfactorily. It has several advantages. The principal ones are: it can be laid in restricted areas very easily; it saves the time which ties up storage space

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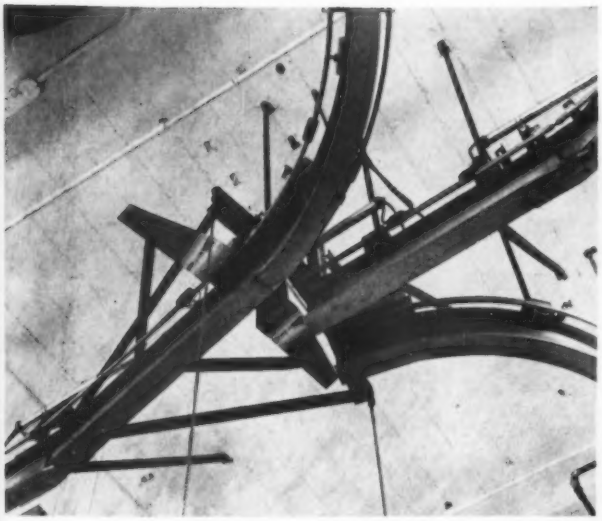
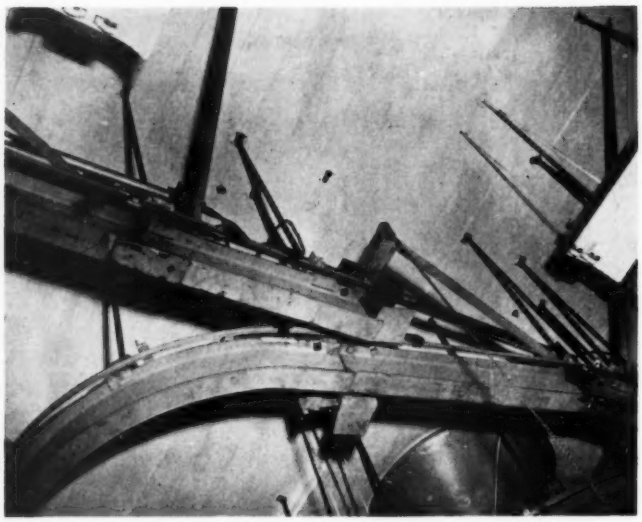


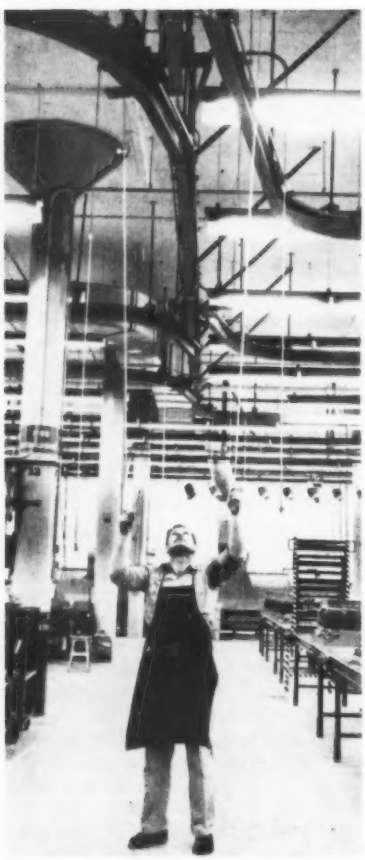
Switch connecting test and service and final assembly



Close-up shows how the I-beams are suspended and operated

Maintenance by Monorail at UAL

Complex system of monorails and switches simplifies maintenance job at United Air Lines' disassembly and reassembly line for their plane motors . . . The $30,000 installation has cut costs to such an extent that investment will be paid off in 5 years



Switches are floor controlled by ropes. Final assembly at left, service at right

INCREASED PRODUCTION and reduced handling are gains from a newly-installed electrified monorail system at United Air Lines' main engine repair shop, at San Francisco airport.

Expanded 75 per cent since it was set up two years ago, UAL's shop now occupies 104,000 sq ft. Its function: to overhaul engines on a preventive maintenance schedule. Shop handles engine overhaul for UAL's 170 multi-engined airliners, composing both the domestic and trans-Pacific fleet.

A typical engine weighs 3000 lb. In the San Francisco shop power plants are disassembled, cleaned, inspected, reworked and reassembled.

Individual parts handling wasn't the problem. For parts are handled and stored in numbered baskets riding slowly overhead on two systems of endless chains, or by parts carts.

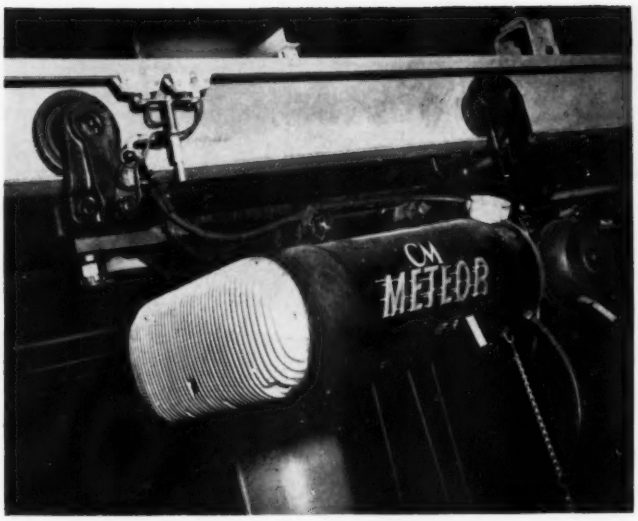
But it was in disassembly of engines and mounts, and in sub and final assembly of engines, that management realized a need for improvement. Before the monorail system was installed, engines were moved about on large wheeled dollies. Chief drawbacks to that method were that dollies occupied too much floor space and, because of interfering framework, only two men at a time could work on an engine.

Now engines are moved along a series of pedestals as work progresses, and three men can comfortably work on one engine. The pedestals, about two feet in diameter, are of varying height, so that work at any stage is always at a convenient level. Workmen stand on rubber mats on the floor instead of on platforms as they did when dollies were used.

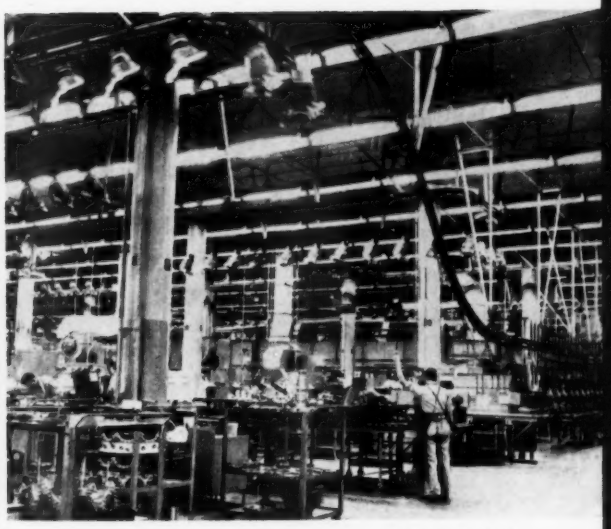
Formerly, 14 men were needed to handle three and a half engines per day on one typical reassembly line. Now 11 or 12 men can build up four engines a day.

It once took two or three men to push an engine around on a floor stand. Now it's a one-man job.

Well, how does this monorail system differ from any other? Mainly in its complexity which, paradoxically, results in a simplified operational flow. Most noteworthy system: that covering engine reassembly, which is divided into subassembly, final assembly and test and checking departments. Here are 18 spurs connected by two cross rails for a total of 760 ft. In these three areas are ten electric hoists driven by geared tractors on the monorail. Control is by push-button switches suspended from each hoist. There are 14 manually-operated tongue switch points, of which four are three-way and the rest two-way.



Double collectors and geared tractors on lower flange of I-beam



Components move through shop via numbered baskets

They are floor-controlled by pairs of ropes suspended 7 ft above floor level.

Five overhead 8-in. I-beams (18.4 lb per ft) cover subassembly; four for final assembly, and nine for test and service. All run parallel to the length of the shop except for the two cross rails and all spurs are connected by switch points.

Beams are hung from the ceiling at 3-in. to 5-in. intervals from U-bolts cast flush with the ceiling. Reinforcing rods in the concrete run through the U-bolts. The beams in the engine reassembly department are stressed for three tons.

On both sides of each beam is a figure-8-shaped conductor bar carrying 220 volt, 50 amp. Power from a three-phase circuit comes through a phase transformer to permit use of two conductors to comply with code.

Here's how the new system works in final assembly of engines: the main case is lowered onto a fairly high pedestal, where the first row of cylinders is fastened in place. The next row of cylinders is secured on a lower pedestal so that the work level is the same, and so on down the line. All pedestals, of course, lie directly beneath the monorail. Hoists are six 2-ton and four 3-ton, averaging 2 hp.

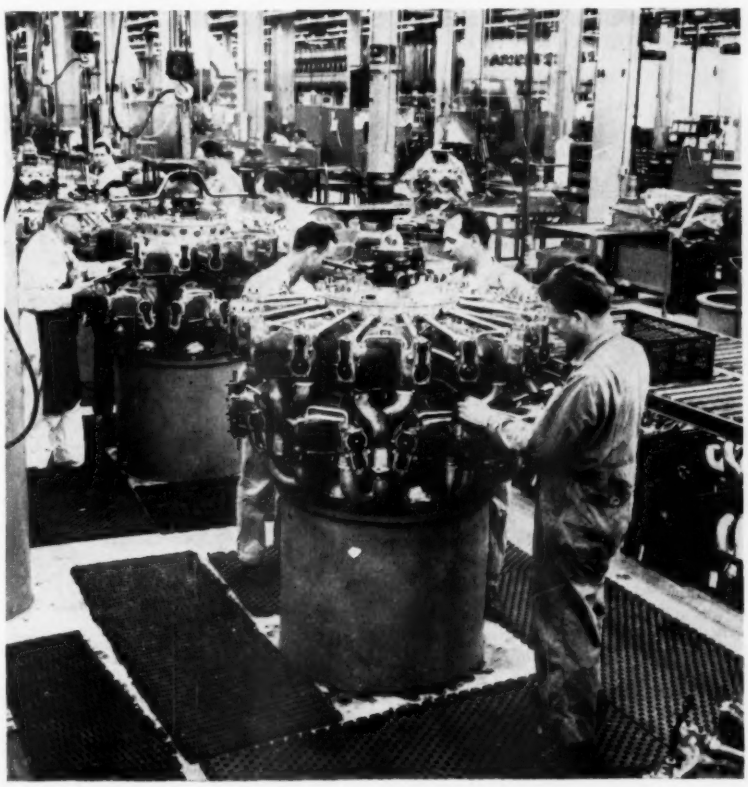
Speed was purposely kept low for easy positioning of engines on pedestals. When you're handling an engine worth perhaps $40,000, you don't want any bumping or dropping. So lift was geared down to 9 ft per min and horizontal travel was established at 50 ft per min, about one-third normal speed.

Besides the tractor-driven monorail system in reassembly, UAL recently made two other major installations of similar nature. One was in the propeller shop, where some 730 ft of monorail extends over 18 spurs. Six three-way and eight two-way switches are included in this setup. For handling propellers weighing 900 to 1300 lb, a 4-in. I-beam stressed for one ton is used. Vertical lift is electrically-controlled, but the prop shop system's hoists are not tractor-driven.

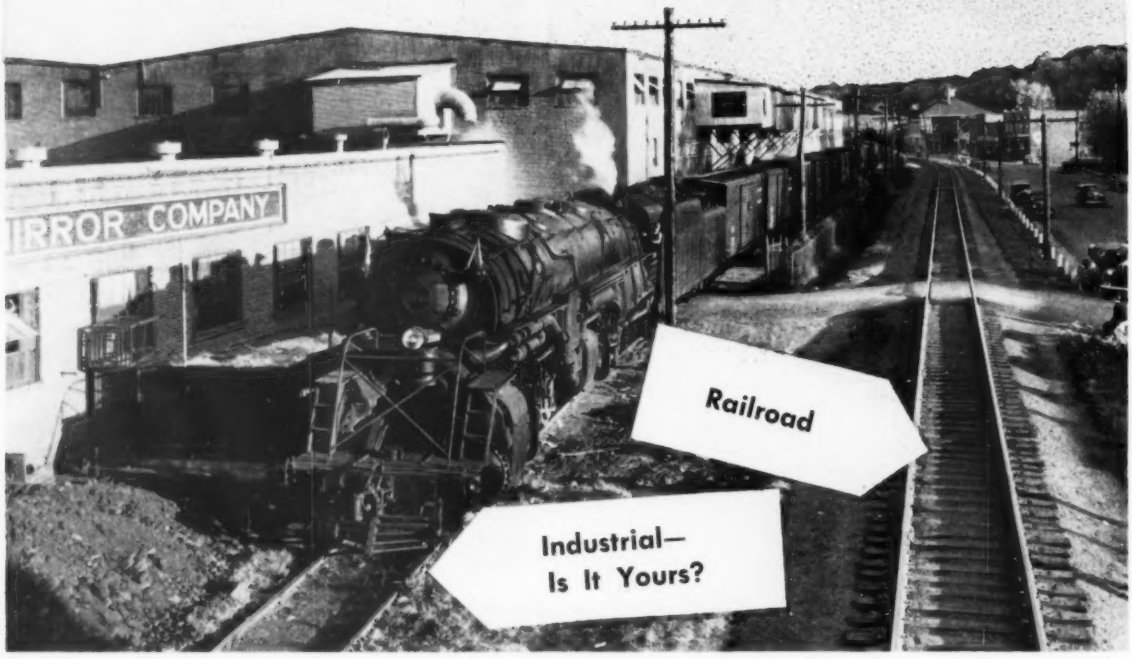
Neither are six bridge cranes installed three each on two parallel runways in engine disassembly at an opposite end of the shop. Bridge cranes were used because of the need for lateral transfer in teardown. The 22-ft bridges are of 15-in I-beam; runways are 8-in. I-sections.

Including bridge cranes, cost of the new monorail system in the prop shop and in engine overhaul was about $30,000. In considering cost it is important to note that the monorail system, or systems, were installed without any interruption of work.

New monorail eases engines onto pedestals where mechanics have better access



INDUSTRIAL RAILROAD TRACKAGE
I. Maintenance and Repair of the Roadbed



This first of a series of articles tells what to do to maintain your industrial railroad trackage and how to do it . . . Other articles to follow will cover ties and tie plates, rail and rail joint bars, and switch materials, accessories and tools . . . Reprints may be made available at conclusion

By W. A. KELLY, Track Specialist, L. B. Foster Company

About the Author

W. A. Kelly's experience in the railroad field encompasses construction, maintenance and operation of rail road equipment at every level from laborer to general roadmaster. Since 1947, he has been a sales engineer with L. B. Foster Company, suppliers of railroad equipment, as a track specialist. A native of New Haven, he previously worked for the New York, New Haven and Hartford Railroad upon completion of schooling at Columbia. He left the railroad to become assistant engineer, Salvage Division, Metals Reserve Company of the R. F. C.

TO JUDGE BY THE readily available information, less attention has been paid to the operation and maintenance of industrial trackage than to almost any other phase of plant operations. The term "industrial trackage" means the railroad facilities in the yards and sidings within a plant's property line and owned by the plant. Of course, the railroad industry itself is fully aware and familiar with all phases of the subject. But there are thousands of plants all over the country that also have track. Because maintenance and repair of track equipment is a highly specialized subject, and because it is only one of many things to worry about, plants tend to neglect this phase of their operations.

However, this neglect is paid for by inefficient movement of materials into and out of the plant; lost time, money and labor in major track repair work that could have been avoided by proper maintenance; and the presence at the plant of conditions that may lead to serious equipment damage—and even injury to personnel.

Fortunately, it does not take expert knowledge of railroad design and operation to adequately maintain and repair industrial trackage. All that is needed is a familiarity with certain basic facts concerning the various components of a trackage system, switch

materials and track tools. A knowledge of track terminology is an important aid in requisitioning and using track tools and equipment.

With this need in mind, engineers in our company have prepared a series of articles for publication in PLANT ENGINEERING, to present this information as simply as possible. This article, the first in the series, will discuss the track roadbed; succeeding articles will cover rails and switch material, track accessories, track tools, and so forth.

Roadbed and Its Importance

As in the case of your plant buildings, a railroad track is only as good as its foundation. In railroad language, the foundation is called the roadbed, and consists of the subgrade and ballast on which the tracks are laid. The key factor, in the over-all picture, is the ballast.

Ballast is the term applied to any material such as crushed stone, chat, slag, gravel, sand or cinders which is placed on the subgrade to maintain proper line and surface. "Mud tracks," laid directly on the ground without any foundation preparation, are still found occasionally, but they have proved to be a constant source of trouble, and maintenance costs of this type of track are high.

Ballast provides a firm even bearing for the ties. This permits the even distribution of the load over the roadbed, reducing surface maintenance. Ballast fills in the spaces between adjacent ties, called the crib, and extends out beyond the end of ties about six inches, and then slopes down to the existing subgrade, to form a ballast shoulder. This shoulder of ballast holds the ties in proper alignment, resisting any lateral movement of the track under traffic.

Properly placed, ballast will assure adequate drainage of the track structure, keeping the ties relatively dry, and extending their service life. By providing proper drainage, "puddling" or "pumping track" is eliminated, and in freezing weather, the problem of "heaving" track is minimized. Rail life is also extended since good track surface reduces rail wear and joint batter at rail ends.

Another advantage of good ballast is its tendency to discourage or prevent entirely the growth of weeds and other vegetation between the ties. It is important that the ballast section be kept clear of such vegetation, since the plant root structure gradually fouls the ballast, reducing its effectiveness in providing adequate drainage for the track.

A well-drained track structure through the use of ballast eliminates the problem of plant employees working around the track in 'slipping mud.' Then, too, ballasted track can be just as easily maintained in wet as in dry weather. Its stability is not lessened by the presence of surface water, resulting from normal rainfall. By contrast, non-ballasted track loses its surface quickly, as the water makes the ordinary earthen subgrade spongy and soft with little bearing value.

Ballast makes it possible to resurface a track easily, whether it be spot surfacing or "out-of-face" raising of the entire track to re-establish the original grade. This may be necessary to compensate for any subsidence of the subgrade or compaction of the ballast under traffic. Main line tracks on Class I Railroads are normally raised "out-of-face" about every 6 or 7 years, depending on traffic conditions. Industrial tracks by comparison, would seldom require such a complete resurfacing operation, the extent depending on all of the factors of usage, soil conditions, and drainage.

Ballast Materials

Crushed stone, chat, slag and gravel are normally used when the loaded freight cars are heavy and where the volume of traffic over the rails is substantial. These materials are also best utilized when sub-soil conditions are poor, or where drainage conditions are restrictive.

These materials provide the greatest degree of sub-grade stabilization and provide the most rigid ballast founda-

It is important that ties be unloaded near installation point

Lining the track to provide tangent track and uniform curves

tion. Where loadings are light or traffic is infrequent, sand or cinders can be used for ballast. With most of the railroads changing over to diesel operation, the principal source of good ballast cinders (bituminous coal) has been diminished practically to the vanishing point in many sections of the country. As a consequence, railroads are turning to the use of small crushed stone, ⅜ in. to ¾ in. in size, and a very satisfactory ballast section is being obtained. This size of stone lends itself readily to shovel tamping, as with cinders, sand or gravel, thereby simplifying re-surfacing operations in future maintenance.

Ballast Check List

As an aid in evaluating the condition of your trackage ballast and in alleviating any deficiencies, use the following as a nine-step check list:

1. Inspection and marking for removal of all poor ties. In section of track to be re-conditioned, normal practice is to place a round white paint mark on tie and on rail web directly opposite.

2. Skeletonizing the track. This consists of the removal of all ballast from the tie cribs, down to the level of bottom of tie. This must be done so that new ballast can be applied. If the track has never been ballasted before, then the same operation should be followed, but cribbing out to at least 3 in. below bottom of tie and on the same plane out at least 24 in. from the end of tie.

3. Remove all excavated material from track and shoulder. This step makes it easier to remove poor ties and install new ones. It also removes the fouled ballast from the shoulder area to improve drainage of the new ballast section to be installed. In the case of a track being ballasted for the first time, removal of the cribbed material is absolutely necessary to provide a level shoulder or sub-grade on which to establish the new ballast section.

4. Unloading new ties. Whenever possible ties should be unloaded as close as possible to actual point of installation. It is appreciated that many industrial tracks are situated in busy work areas where it is impossible to spread the ties out very far in advance of the actual installation. In such cases, it is better, in the interests of safety, to unload the ties at a convenient storage point, from which the ties can be trucked to site as required on a day-to-day basis.

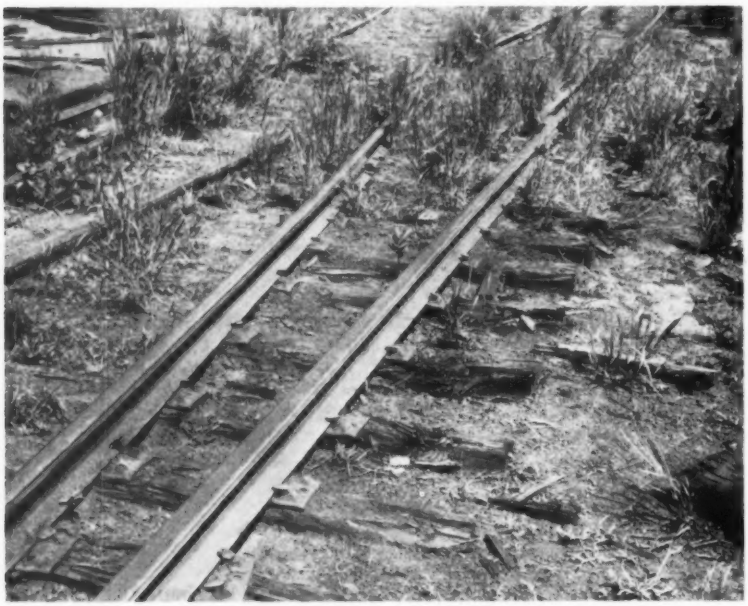
5. Removing the poor ties and replacing them. In the interest of safety, whenever conditions warrant, the old ties should be trucked out and work area cleaned up at the close of each day's work.

6. Unloading of ballast by work trains. This operation, using a work train, is followed by the railroads in their ballasting operations on programmed work. The industrial application of this method of placing the ballast in the track area would depend on the length of track and the quantity of ballast required. Smaller scale operation can be set up using trucks to bring in the ballast, spreading it by hand or by using a track push-car for the job.

7. Raising the tracks, placing the ballast, and tamping.

8. Lining the track. To provide tangent track and uniform curves, both of which will simplify future maintenance.

9. Dressing the ballast section. To provide a uniform, neat appearance in finishing the operation.



Close-up of ''mud'' tracks, that is, track without a good firm ballast which permits proper drainage. Lack of drainage has resulted in ''puddling'' or ''pumping'' track in rainy weather and in freezing weather, ''heaving'' of track

Skeletonizing the track and removing excavated material from track and shoulder. This makes it easier to remove and install ties. It also improves drainage by replacing fouled (weed-filled and muddy) ballast with a new ballast section

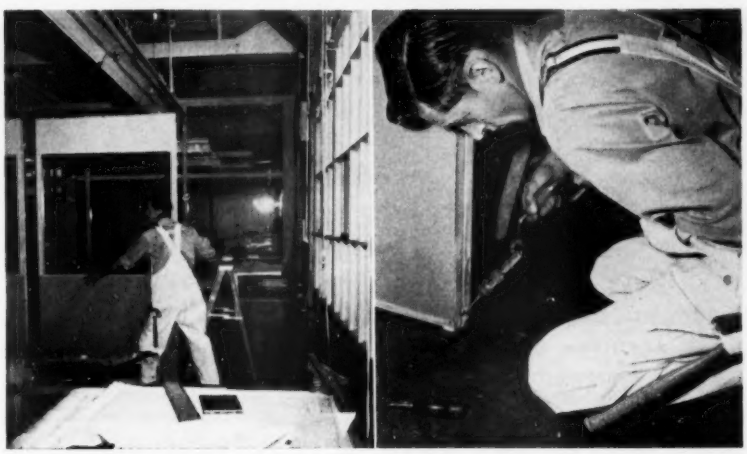
How Norton Company "Builds Its Own"

Movable partitions, planned as an expedient, proved to be so well designed and adaptable, that the Company has now standardized specifications on these units

TO MEET ITS needs for office partitions of a temporary nature, Norton Company of Worcester, Massachusetts, designed its own standard partition. After several years of use, these reusable panels have more than saved their cost. Made of wood in standard 4 ft sections, these panels are quickly installed or removed. Wooden splines hold the sections rigid while screws hold the panels solidly to the floor.

Baseboards and stiffeners along the top hold the entire wall in line. These standard panels have glass in the upper half except for the door panels which are of wood.

While these panels were originally designed for temporary use, they are now being installed as permanent sections in large areas where there is a possibility of eventual rearrangement.



Figs. 1 and 2. In photo at the left, Carpenter Lewis Heirtzler is pushing one of the panels into place. In photo at right, Mr. Heirtzler fastens section to floor

Fig. 3. Sketch showing simple but sturdy construction of both wall panels and door sections. Doors have no glass panels

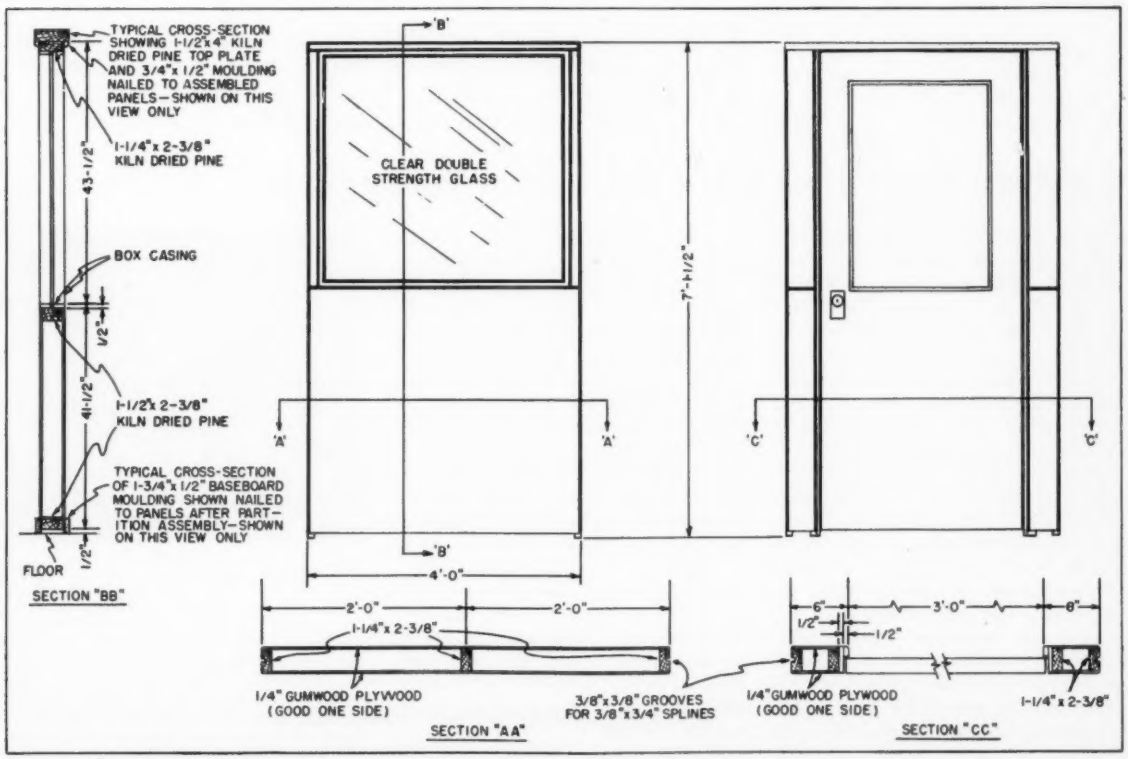


Fig. 1. Aerial view of Solar Aircraft plant, Des Moines, Iowa. Plant has 550,000 sq ft of floor space under one roof

Solar's Plant Engineering Department Is Organized for Top Performance

A brief resume of Mr. Olchoff's paper, presented at the first Western Plant Maintenance Conference, was mentioned in the September issue . . . Here is a more complete picture of the plant engineering operations at Solar Aircraft

By **MAURICE OLCHOFF**, Plant Engineer, Solar Aircraft Co., Des Moines, Iowa

OUR PLANT ENGINEERING Department, of which maintenance is a part, has the responsibility of maintaining all capital investment of the corporation. This includes building and grounds, manufacturing machinery, and operation of all utilities. In addition, we prepare plans and specifications for the purchase of equipment, recommend purchase of equipment, design special machines, and design all utilities for our plant.

We have a plant population of approximately 3000, including over 550,000 sq ft of floor space all under one roof with all manufacturing on one floor. The quality of our work conforms to Army and Navy standards in addition to our customers' requirements. We have more than 300 resistance welders; 150 turning lathes between 36 in. and 64 in. swing, 12 electrical heat treat furnaces over 300 kw capacity, and many other processes; such as, forming, Heliarc welding, argon welding, induction heating, and copper brazing. We work with stainless steel and other alloys costing at least fifty cents per pound.

Essentially, we have two distinct groups in our department; namely, the Maintenance group and the Engineering group.

The Engineering group is headed by the Plant Engineer on whose staff are an electrical engineer, industrial engineer and mechanical engineer. This is in addition to a preventive maintenance supervisor, designers and clerical he'p. This group, essentially, does all the planning, engineering, issuing of larger work orders involving engineering design, planning of maintenance procedures and has contacts with outside vendors.

The Maintenance group is headed

Mr. Olchoff has been the plant engineer of the Des Moines plant since 1942. He received his Bachelor of Science degree in Mechanical Engineering at the University of Illinois in 1923. He is a member of the American Society of Mechanical Engineers, and is the present Chairman for the Central Iowa Section. He is also active in the Iowa Engineering Society, and serves as Vice Chairman of the Mechanical Section.

by the Assistant Plant Engineer who reports to the Plant Engineer. Our plant is divided into four areas. Each area is under the supervision of a machine maintenance foreman. There is also a machine maintenance foreman to whom we assign major projects. The head of our electrical maintenance and building maintenance sections, as well as the machine maintenance foremen, report to the Assistant Plant Engineer. It is the responsibility of the foreman to whom an area is assigned to secure the services of the other operating groups; such as, electrical and building groups, and to take the responsibility of all requests and demands for maintenance in his area.

Essentially, we have a combination of a centralized and area type of maintenance organization. The area type group have a responsibility of satisfying the requests in their area, and the centralized section to give service as needed since the demands for each area unit are varied as to volume of work.

Most of our supervisors are men who have come up from the ranks of our workers. Their experience is invaluable to us as well as the experience and ability of our workers. Some eight years ago, we realized that the volume of our machines and their complexity required that we develop technically trained engineers to assist the supervisors and train our workers. This decision was made as we foresaw that technological developments of our industry would require greater skill and knowledge of basic engineering principles and, in general, more engineering within our group.

Electrical, mechanical and industrial engineers, as one of their duties, work closely with the supervisors in maintenance and with the workers to help with their skill and training. They also act as the Plant Engineer's representative to the maintenance group. We have been able to develop an Assistant Plant Engineer from this engineering group.

The problem of behavior of the group is of great importance to any organization. In order to operate effectively with the least amount of friction, we do the following:

(1) The Plant Engineer meets weekly with all the stewards in the department to discuss any complaints they may have and the overtime schedule and distribution of time. This has been found to be effective in cutting down grievances and in developing mutual confidence. These meetings are not attended by the other supervisors in the department.

(2) The Plant Engineer meets weekly with his entire staff of supervisors to discuss, in general, the operating problems and to notify them of what work is being considered, complaints received, and to secure their suggestions on any changes we propose, and to receive their complaints and suggestions.

It is important that the stewards in a department be respected as they are the elected representatives of the men who work for you. Their attitude towards you and the company reflects to a great extent the attitude of the workers themselves. The supervisors in the plant want an opportunity to lead their men and should be given the opportunity of being considered a part of management of the group. Most workers rightfully desire an outlet for their creative instinct and recognition of their importance.

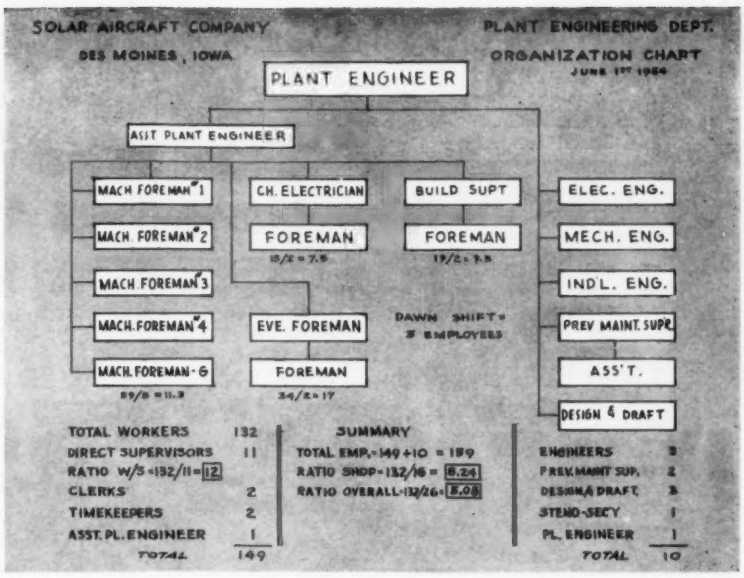
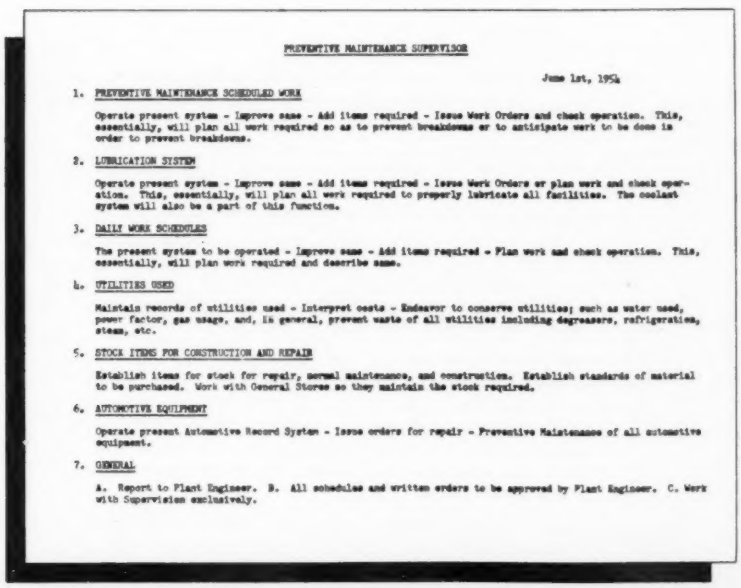


Fig. 2. Chart shows how present plant engineering department is organized



PREVENTIVE MAINTENANCE SUPERVISOR

June 1st, 1954

1. PREVENTIVE MAINTENANCE SCHEDULED WORK

Operate present system - Improve same - Add items required - Issue Work Orders and check operation. This, essentially, will plan all work required so as to prevent breakdowns or to anticipate work to be done in order to prevent breakdowns.

2. LUBRICATION SYSTEM

Operate present system - Improve same - Add items required - Issue Work Orders or plan work and check operation. This, essentially, will plan all work required to properly lubricate all facilities. The coolant system will also be a part of this function.

3. DAILY WORK SCHEDULES

The present system to be operated - Improve same - Add items required - Plan work and check operation. This, essentially, will plan work required and describe same.

4. UTILITIES USED

Maintain records of utilities used - Interpret costs - Endeavor to conserve utilities; such as water used, power factor, gas usage, and, in general, prevent waste of all utilities including degreasers, refrigeration, steam, etc.

5. STOCK ITEMS FOR CONSTRUCTION AND REPAIR

Establish items for stock for repair, normal maintenance, and construction. Establish standards of material to be purchased. Work with General Stores so they maintain the stock required.

6. AUTOMOTIVE EQUIPMENT

Operate present Automotive Record System - Issue orders for repair - Preventive Maintenance of all automotive equipment.

7. GENERAL

A. Report to Plant Engineer. B. All schedules and written orders to be approved by Plant Engineer. C. Work with Supervision exclusively.

Fig. 3. Instruction sheet illustrates duties of preventive maintenance supervisor

Cooperation Among Departments

Another very important phase of the attitude and behavior of your group is the realization that other departments in your plant are of great importance to the plant's operation. Their ideas must be respected and wants satisfied. It is only a question of a meeting of minds on most problems and personalities. The ability of your group to recognize the importance of other

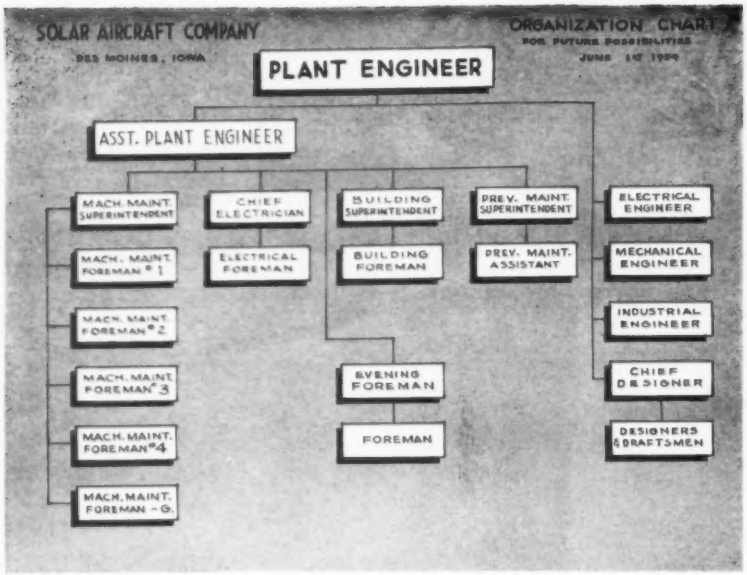


Fig. 4. This chart shows the organization changes that are contemplated

groups will greatly broaden their outlook towards their job. Your ability in developing this in your men will greatly contribute to the success and growth of your department.

All these human characteristics are referred to as "M.B.Q."—Maintenance Behavior Qualities. The creation of the atmosphere, leadership, and training to secure these present many problems and disappointments. The realization of these will result in a group of men who will enjoy their work, do better work, have greater production output, bring to light many things which have been overlooked, overcome possible mistakes, and improve many good plans. The extreme difficulty and cost of standardizing all work in maintenance make it very important that every effort be made to control effectively the individual's attitude toward his work.

The responsibility of developing M.B.Q. for the maintenance department should start with top management in your group and continue to the foreman level with the objective that your workers will realize what is required of them for your activities. The program usually carried on by the Industrial Relations Department is inadequate as maintenance problems are of greater scope and importance than production.

Preventive maintenance should be considered as a function of prime importance and as a "must" function with control established on it comparable to a break-down work order. Preventive maintenance is the performance of operations to company facilities with the knowledge that, if not performed, wear or a break-down would be accelerated beyond the point of economy. The important decisions to make are: (1) To know your problem, and (2) to determine when the solution has been economically reached. After the preventive maintenance system has been put into operation, constant study should be made so that economy is applied to the system by eliminating excess work.

It is my opinion that failures of plant facilities may be minimized and more effectively maintained by:

(1) Defining responsibilities of maintenance.

(2) Controlling "Maintenance Behavior Qualities."

(3) Establishing a workable organization chart.

(4) Providing a creative atmosphere for the workers.

(5) Providing a workable preventive maintenance program.

Ultimate goal of maintenance should be to establish a system of standards, methods, and control comparable to that required in production. The organization described here has proven helpful in establishing this objective to meet the variable problems of maintenance.

Need for Routine Operations

The necessity of establishing routine planned operations of preventive maintenance and tabulations of routine work is of prime importance. These planned operations will tend to keep the organization busy and require very little supervision. The entire organization will also have the feeling that they have a definite responsibility to perform as their contribution to the department's activity.

This is only a partial description of our efforts to effectively control the management and organization phase of the activities of the Plant Engineering Department. It is the result of our attempt at reaching a solution by trial and error and the elimination of some factors which require this approach to reach a workable plan.

Maintenance is a challenge and, if well executed, brings confidence in your facilities to the production department, the maintenance department and to management.

PLANT ENGINEERING DEPARTMENT — PREVENTIVE MAINTENANCE

Description: CALIBRATE HEAT CONTROL PANELS Units Involved: ALL PRESS & SEAM WELDERS Instr. No. 27

Purpose: SEE BELOW Crafts: ELECTRONIC-ELECTRICIANS Resp.: ELECT. DEPT. Frequency: 6 MONTHS

Work To Be Done:

The purpose of this Preventive Maintenance is to establish a standard reference point and correct the calibration of the heat dial of all spot and seam welders and to make any necessary adjustments in the panel for proper operation.

The following work to be done:

1. Adjust transformer taps to lowest heat (1-1). Turn heat dial to 100 to adjust weld time to 30 cycles with slope control off.
2. Insert 5/8" electrodes - THEN 1109-A and use 1/4" x 2" copper bus bar to simulate work. For seam welders, see below.
3. Connect scope across its load bank and fire the welder to check phasing at 100%.
4. Adjust power factor tap until the machine reaches 100% heat at a dial setting between 95 and 100. In no case shall the machine phase in at a heat dial setting of less than 95. If power factor correction is made with slidewire, paint final position of slide on tube with yellow paint.
5. Correct balance of ignitrons, if necessary.
6. Check timing circuit with cycle counter and recalibrate, if necessary.
7. Make notation on maintenance cards of following:
   a. Dial setting for 100% heat. (Before and after calibration.)
   b. Power factor tap position. (Before and after calibration.)
   c. Pertinent remarks with reference to timing changes and any other adjustments made.
   d. Line voltage at welder terminals.

DATE 6-1-54 Revised: _____ Revised: _____ APPROVED BY: M. Eckhoff

Fig. 5. Instruction sheet describes one of the preventive maintenance operations

Fig. 1. Pressure piping for fresh coolant delivery, and open return trough for spent coolant, occupy same covered channel

Central Coolant System Boosts Grinder Efficiency

Grinder down-time and non-productive labor have been eliminated, and a constant supply of clear coolant is assured, in this new parts-plant installation

CENTRAL COOLANT system which supplies continuously filtered coolant to all the plant's grinding machines substantially boosts efficiency and quality of grinding work at the new Warner & Swasey parts plant at New Philadelphia, O.

One of the few such systems to be incorporated in new plant design in the country, the coolant operation centers in a below-floor filtering and reservoir installation.

All of the plant's grinding machines are served by pressure piping from two 2100-gal filtering tanks in this room. Spent coolant containing work chips and abrasive particles is discharged from all the machines into a covered floor channel through which it flows back to the filtering tanks by gravity.

Spent coolant drops into either or both of the filtering tanks, which incorporate continuous roll feeds of 48-in. wide filtering paper to strain the contaminating particles from the fluid. Clear coolant, withdrawn from the bottom of the tanks, is pumped back to the machines at a maximum relief valve setting of 25 psi.

The system is so interlocked that one or all of the three 450 gpm vaned impeller-type pumps may be operated in conjunction with one or both of the filtering tanks in accordance with the number of machines operating. Twenty-eight grinders are presently working in the system, which has an ultimate capacity of 40 machines.

Pumping rates and paper feed are regulated by level control switches in the tanks.

Used filter paper feeds down into steel bins at rear of the filter room, where a fenced opening to the plant above permits periodical removal for disposal by the overhead bridge hoist serving the bay.

With centralized control, coolant waste is virtually eliminated; there is no throw-away involved as otherwise might be the case due to mixtures growing rancid in temporarily idle machines.

The system makes it possible to maintain a uniform coolant temperature consistently, making it simpler to hold sizes accurately on the machines. The complete installation is expected to pay for itself in two years.

Fig. 2. Spent coolant discharges into these filtering tanks where the wide filtering paper removes metal particles

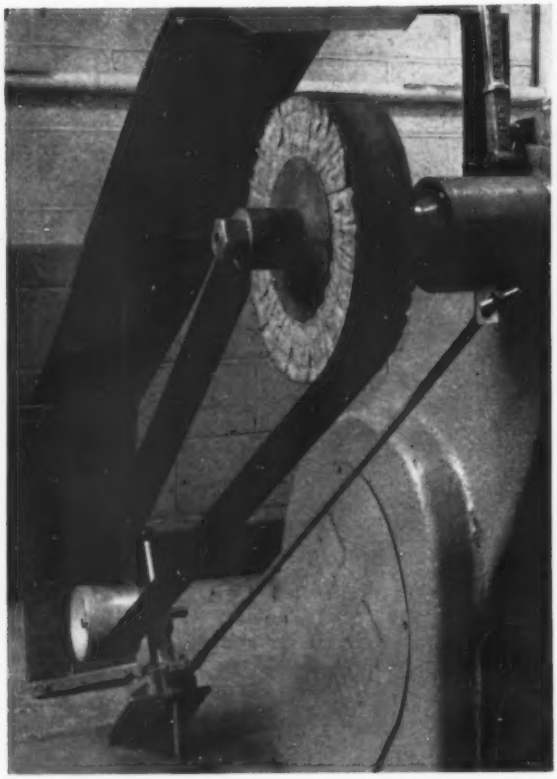


Fig. 1. Coated abrasive belt mounted on polishing lathe and backstand idler ready to be used in off-hand polishing

Fig. 2. Deburring a formed sheet metal product on a coated abrasive belt which is running over a flat platen surface

COATED ABRASIVES— What They Are and What They Do

This present article is a continuation of the current series on abrasives of all types . . . Explanation of how different abrasive grains, backings and adhesives make product versatile . . . What these products are used on and how

By E. E. OATHOUT, Product Engineer, Behr-Manning Corporation

COATED ABRASIVES, the technical name for sandpaper and similar products, have been improved in quality during the last 20 years until now they are considered capable of doing almost any cutting or polishing job in industry. Belts of coated abrasive material are used for the light snagging of castings, polishing stampings, shaping contoured products, polishing precision machine parts, removing weld beads, finishing wood or plastic—and are saving time, money and materials for the users.

Some of the reasons for the advantages of coated abrasive can be easily observed in an elementary study of a coated abrasive belt in action. In Fig. 1, a coated abrasive belt is shown mounted on a polishing lathe and backstand idler ready to be used in offhand roughing or polishing.

Although the radius of the working area is no greater than a set up wheel, the belt has a much greater working length. Consequently it cuts cooler at higher speeds than set up wheels. Down-time to change a coated abrasive belt is practically insignificant because no flanges, spindle nuts, or guards need be removed or changed.

Merely move the idler pulley forward slightly, pull the old belt off, slip the new one over the wheels, release the idler and the change is complete. Because the belt is flexible it can be used to polish compound curves or contours in molded or cast parts. When used over a soft contact wheel, mounted on the lathe spindle, the flexible belt will give under pressure and conform to the shape of the work held against it.

When a coated abrasive belt is used with a hard contact wheel or run over a flat platen (Fig. 2) the location of the point of contact with the work does not change the use. In other words, the diameter of contact wheel is not affected by wear on the belt and when a belt is worn to any sig-

nificant degree it is usually ready for replacement.

The use of a belt over a flat platen deserves particular attention in a discussion of belt versatility because here the flexibility of the coated abrasive belt permits a production technique not possible in any other form of grinding. It permits straight line finishing over the full area of a flat surface. This characteristic is of particular value to users of automatic sanding machines because it eliminates costly redressing and reshaping of control wheels as must be done in centerless grinders every time the rate of work-feed is changed or a different part design is to be worked.

Why They Cut

Deeper penetration into the theory of coated abrasive manufacture reveals why this material cuts fast and smooth. Cutting particles are mounted upright to the flexible backing of a coated abrasive belt in a layer of adhesive. With little more than one half of each particle firmly embedded in the adhesive, the exposed end is free to penetrate into the work. This contributes to the free cutting characteristics of coated abrasives.

The even distribution and alignment of the abrasive particles accounts for the fine finishes produced by coated abrasive belts. Each grain penetrates the work to the same depth as adjacent grains and surface scratches are produced at equal intervals across the work.

The two main classifications of abrasives are "natural" abrasives and electric furnace abrasives. Flint quartz, garnet and emery are the natural abrasives, and silicon carbide and aluminum oxide are the electric furnace abrasives.

The oldest commonly known abrasive is flint. It is the abrasive on the everyday product sold in hardware and paint stores. Flint has few industrial applications because in crystal form it lacks the hardness and durability required of production operations. Being a low cost abrasive it is useful as a paint or varnish remover—a job which quickly ruins any coated abrasive material regardless of its quality. The material becomes filled with paint before the abrasive breaks down.

Garnet, on the other hand is a very useful natural abrasive in industrial applications. Particles of this material are sharply pointed and tough, and when finally broken the fractures produce more sharp points.

Garnet coated papers are generally used in the woodworking industry for finishing wood "in the white" or after staining and a shellac coat has been applied. It is usable for both hand work and machine work. It is available in discs and sheets for hand work; in belts for machine use; or in roll stock for making sanding drum covers.

Emery abrasive is of very little industrial value except as a polishing agent. It has a relative weak grain structure and in addition the grain shape is rounded. The cutting action of emery is very slight.

Silicon carbide is the hardest and sharpest of the two electric furnace abrasives. In fact it is second only to the diamond in hardness. However, its brittleness limits the usefulness of silicon carbide primarily to machine grinding of soft non-ferrous metals. Here full advantage can be taken of the sharpness and hardness of the material without danger of destroying grain structure. Silicon carbide is also used with a waterproof backing for wet sanding metal products, glass and ceramics.

Aluminum oxide is the most widely used grain on coated abrasive materials for the metalworking industry. Grains of aluminum oxide are not quite as sharp as silicon carbide but the material has great toughness—that is, it does not fracture easily. This quality makes it ideal for roughing and polishing steel, cast iron and other hard materials.

Five different kinds of backings are used on coated abrasives: paper, cloth, paper-cloth combination, plain fiber and fiber-cloth combination.

The principal weights of paper used for backings on coated abrasives suitable for industrial service are— A, C, D and E weights. From A to E, these papers increase in stiffness and strength.

"A" weight is the lightest and most pliable. It is used in "finishing papers," which are primarily designed for light hand sanding operations where maximum flexibility is the main consideration and strength is secondary.

"C" and "D" weight backings are used on hand or light machine sanding operations where more strength or additional stiffness is required. In the woodworking industry C and D weights are referred to as "cabinet papers."

"E" weight is the stiffest and strongest of the paper backings. It is principally used for drug sanding work where the backing must have the strength to withstand the forces imposed by these severe operations.

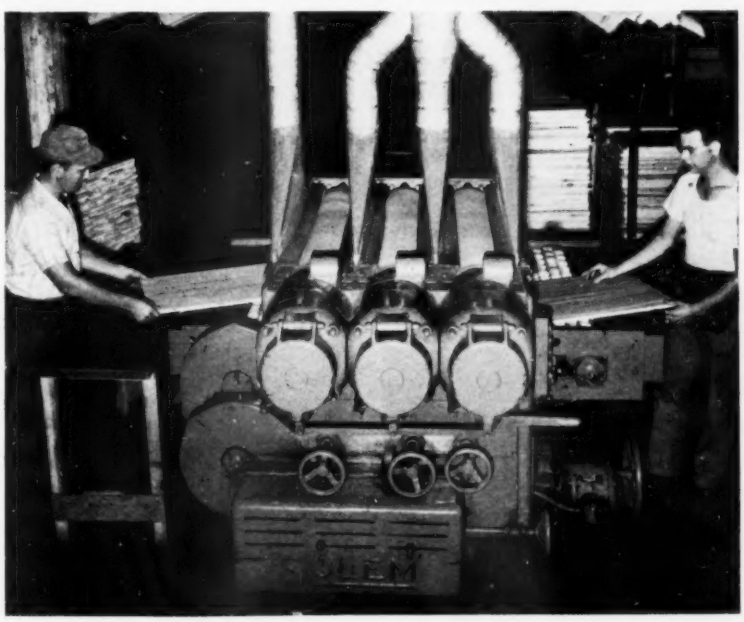
Cloth Backings

Coated abrasives are used on many operations where flexibility, greater durability, and resistance to tearing are required than the various paper backings provide. For such operations cloth backings are used.

Cloth backings are made in two weights as follows: "J" weight—(Jeans)—these are the lighter and more flexible of the cloth backings. They are used principally for contour work and finishing. "X" weight—(drills)—these are the heavier and stronger cloth backings, used for stock removal in flat work.

All cloth backings are specially

Fig. 3. Triple drum sander being used to sand wooden cabinet panel. Coated abrasive drum covers, visible between hoods, are made from E weight stock



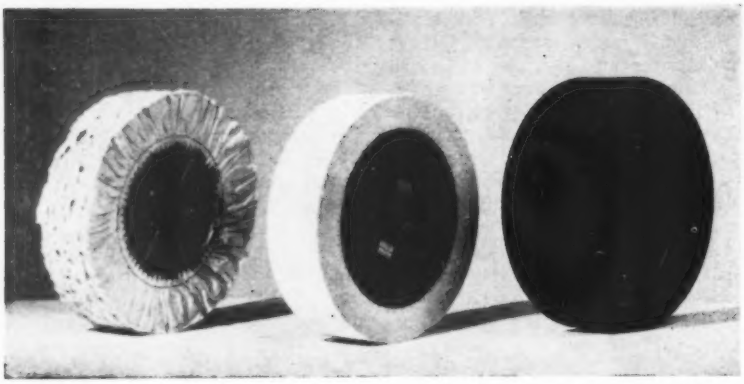


Fig. 4. Three most generally used contact wheels: at left, wheel made of cloth buff segments; center, compressed canvas wheel; right, rubber on aluminum hub

processed before coating to provide a smooth surface for the abrasive, to increase strength and to minimize stretch in use.

Paper-cloth combination backing consists of layers of paper and cloth glued together. It provides a coated abrasive that has better tear strength than a paper-backed product, at a lower cost than one with a cloth backing of comparable strength. It is used mainly on abrasives for the shoe trade and for the coarse grits of floor sanding abrasive products.

Plain fiber is a stiff, strong material with portable electric pneumatic flexible shaft disc sanders. It is highly resistant to tearing and breaking and is also used for drum covers in the woodworking industry.

Fiber-cloth combination is a combination of hard, springy vulcanized fiber with heavy drill cloth. It is used as the backing for the glue-bond fiber combination discs and gives them exceptional toughness and durability to stand the wear and tear of high speed polishing and finishing.

Basically, there are three types of adhesives used to anchor the abrasive grains to the backing: hide glue, synthetic resins and modified resins. An improved bonding agent results from the addition of chemical ingredients to either hide glues or synthetic resins.

Hide glue is generally used for most dry sanding operations, such as the finishing of wood. However, glue bonds being soluble in water are not used on abrasives in applications requiring water as a lubricant.

Resin Bonding

Resin bonded coated abrasives can be specially treated to become waterproof. These products are used in severe metal working jobs where grinding heat is a factor and where a lubricant is required.

A double layer of adhesive is applied to all coated abrasive products: one to the backing before the grain is embedded, and the second layer over the abrasive grain. The second application of adhesive falls between each individual grain to unite with the first coating of adhesive to doubly insure locking the grains to the backing.

When a double coating of glue bond is used, the resulting product is considered a glue type coated abrasive product and is best suited for polishing and general dry sanding.

Frequently, on the toughest jobs such as weld removal and blending where high grinding speeds are used, waterproof coated abrasives are recommended. These are obviously used with a lubricant to increase rate of cut and reduce grinding heat. Waterproof coated abrasives have a double bond of resin and a waterproof backing.

The grit number marked on the backs of coated abrasive belts indicate the size of the grain used as the abrasive. A 60 grit coated abrasive belt is coated with abrasive grains which have been screened by a silk mesh of 60 openings per linear inch. These grit numbers range from 12 to 600, the lower number producing the roughest surface but the most aggressive cutting action and the higher number producing the smoother ground surfaces but with correspondingly reduced speed of cut.

There are two methods of coating abrasive grain to a backing: closed coat and open coat. Usually a coated abrasive product is marked on the back according to the method of coating used in its preparation.

The grains on closed coat products are densely packed and cover the surface completely. Closed coated products contain the greatest possible number of cutting edges per inch of backing and are used for normal cutting and polishing operations.

On open coat products, about 50 per cent of the surface is covered with abrasive grains. This type of coating is used to sand varnished surfaces, soft materials, paint, gummy wood and other materials that have a tendency to load the paper. The voids between the grains prevent particles of the sanded

Fig. 5. Workman using a vibratory type sander to finish wooden cabinet

Fig. 6. Using disc sander to remove weld beads on a stamped sheet metal

Fig. 7. Polishing aluminum vacuum sweeper nozzles on coated abrasive belt

material from becoming lodged between adjacent abrasive grains and loading the paper.

Performance of a coated abrasive belt is largely dependent upon the characteristics of supporting equipment with which it is used. Principle elements include the density of the contact wheel, the viscosity of the lubricant (if used) and design of the grinding machine.

Contact Wheels

The majority of contact wheels being used in industry are made of compressed canvas, cloth buff segments or rubber rims on aluminum hubs. The densities of the wheels range from super soft to extremely hard in cloth wheels and from Durometer reading 10 (sponge) to 90 (hard rubber) in rubber wheels. These contact wheels are also available with various working surface designs. Contact wheels and flat platens of steel or cast iron are used in many precision production machines using belts.

In general, cloth contact wheels are used for finishing and polishing work while rubber wheels are used for removing stock. Wheels of low density (both in cloth and rubber) produce better finishes than high density wheels.

Each type of contact wheel is built to do a specific operation better than the others. Desired results are obtained much faster at a considerable saving in both time and labor.

Unless the purchaser of contact wheels is well versed in their capabilities, it is wise to allow a qualified coated abrasive engineer to determine which contact wheel is the most feasible to do the job most efficiently.

Use of Lubricants

Lubricants improve the finish produced by a coated abrasive belt and prevent the belt from being glazed by residue picked up from the work.

For coated abrasive belts these lubricants range from stick waxes to water. Standard cutting oils and water soluble oils are often used in production type belt machines

Greases produce finer finishes than dry grinding in similar grits by settling between abrasive grains and cushioning the penetrating action of the abrasive into the work. The crest of each grain is free to cut but deep scratches are prevented by the lubricant. This lubricant also makes polishing action easier.

Fluid lubricants are used primarily to prevent belt glazing. This action is required in grinding light non-ferrous metals such as aluminum because these materials have a strong tendency to load abrasive belts. Water is a good lubricant for keeping a coated abrasive belt free of ground particles, but should be used with a rust inhibitor to protect the work and the machine from rusting.

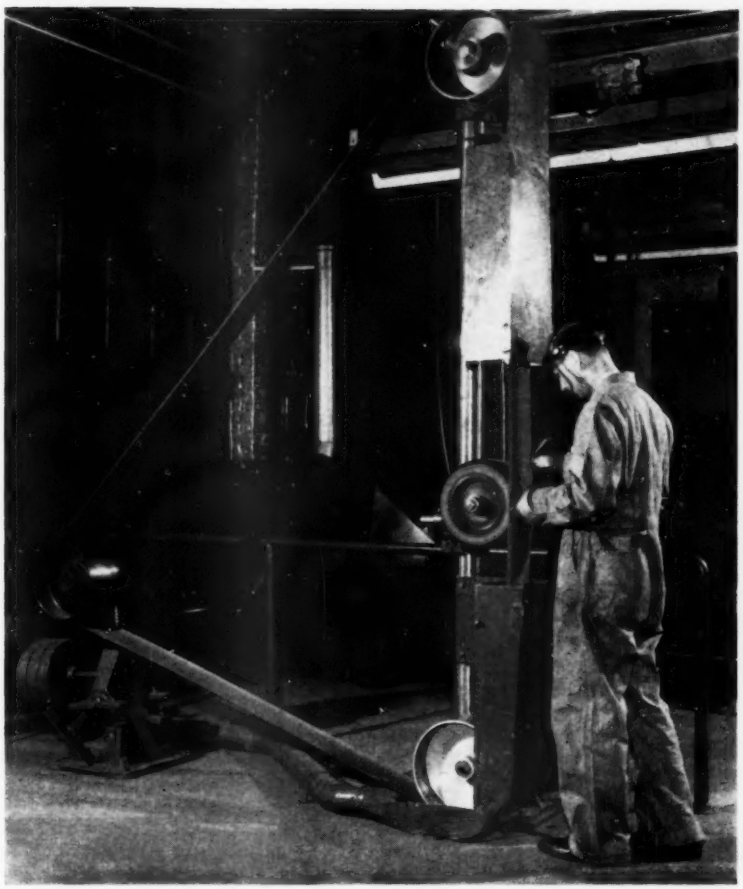


Fig. 8. Belt polisher of the type designed for deep contour polishing. Belt is not required to stretch excessively. Contact wheel can be shaped to many contours

Machines which use coated abrasive products can be classified in 3 groups: portable sanders, off hand polishers and automatic belt grinders.

Portable sanders fall into two general types: vibratory sanders, Fig. 5, and disc sanders, Fig. 6. Portable sanders are powered by electric motors, air motors or flexible cables.

There are two types of vibrator sanders: those with orbital motion, and those with reciprocating motion. The vibrator sander with orbital motion is used in the automotive repaint, industrial repaint and salvage operations as a feather edger. After a damaged section of a painted sheet metal surface is bumped out and cleaned, the feather edger is used to blend or taper the remaining paint into the cleared area.

The reciprocating vibrator is used in the woodworking industry to finish the fine surface of wood products. The straight line action is aligned with the grain of the wood to permit maximum sanding action with no cross grain cutting.

Disc sanders are usually used for grinding down hammered surfaces, removing flash from castings and other roughing jobs. One of the largest fields of application for a disc grinder is in the metal cabinet manufacturing industry. Here, metal workers remove weld beads, match door panels, etc.

In general, portable sanders are used where the work is too large to be carried to the machine. Where the work to be ground is small enough to be carried to the machine it is usually offhand polished on a belt backstand. Fig. 7.

Portable Sanders

Belt backstands consist of a polishing lathe, a contact wheel, an idler wheel and a coated abrasive belt. Offhand polishing on belt backstand is done in the metal working, woodworking and plastic industries usually to grind and polish irregular shapes such as a vacuum sweeper nozzle, chair backs and plastic hair brush handles.

Offhand polishing is used to a great

(Continued on page 196)

What an Instrument Department Can Do for Your Plant . . . II

What should an assistant or junior instrument engineer be expected to know? . . . How much experience should he have had? . . . What should be the duties and what the experience expected of a senior instrument engineer? . . . How about the chief instrument engineer? . . . Where do they all fit into the plant's scheme of things . . . These are some of the many questions answered in this article

By CHESTER S. BEARD, Research and Development Engineer, Foster Engineering Company

MOST INDUSTRIAL plants that require instrumentation should have an instrument department that can perform all of the steps which have been outlined in Part I of this article.

For purposes of discussion a hypothetical Instrument Department will be outlined. This department may include a trainee, who may be called junior instrument engineer. The group may include numerous junior instrument engineers and trainees. This group can be a unit in which the senior instrument engineer is the head of the Department. As the Department is enlarged, the chief instrument engineer may have one or more senior instrument engineers and instrument groups under him.

Although the following job discription has been laid out for an assistant or junior instrument engineer (depending upon the size of the Department), many of these functions may be assigned to female personnel. The junior instrument engineer who is a trainee works under the supervision of the senior instrument engineer. With the information furnished by this man, the trainee does the following:

(a) Lists the instruments shown on piping and instrument drawings on schedules.

(b) Prepares requisitions for Bills of Material.

(c) Sizes valves, using charts supplied to him.

(d) Tabulates orders for check on placement, acceptance, delivery date, and certified prints.

(e) Revises orders to conform to changes.

(f) Calculates orifice sizes using the system which has been selected for that particular job.

(g) Records the time for the Department.

(h) Carries on engineering clerical assignments, at the request of the senior instrument engineer.

To qualify for this job a man should have good general health and neat appearance. His education should include two years of college in which he majored in engineering, physics or mathematics; or, as an alternate to his college work, graduation from mechanical trade school in which physics and mathematics were prerequisites. No experience is required. The man must show interest in industrial instrumentation and must be willing to study instrumentation and show a desire to take advantage of any courses which may be offered by his company or by the local technical societies or schools.

Graduation from this classification would be to the title of senior instrument engineer. This senior instrument engineer works under the personal supervision of Chief Instrument Engineer. He has job supervision of the junior instrument engineers and clerks assigned to him. He must be able to carry on all assignments of the men under him. With his supervisor he reviews a new job with the junior instrument engineer.

His duties consist of obtaining and reviewing data that is necessary for selection of instruments, sizing of valves, and calculations of measurement, summarizing quotations, determining installation methods by selection of a company's or client's standard drawings, or by submitting sketches for non-standard installations.

He is instrumental in the design of the control board, either on his own initiative or in cooperation with a supplier, and he assigns statement of services of the instruments for use on name plates as well as taking the initiative in questioning the piping and instrument drawings. He has contact with the Job Engineer and Process Department and furnishes all data and instructions which are necessary for preparing instrument drawings to

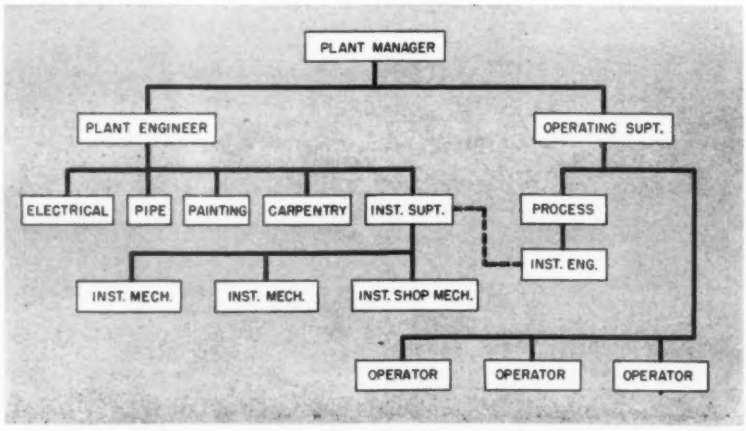


Fig. 1. This hypothetical organizational chart shows where the instrument department and its personnel will fit into the small or medium size company

the instrument drafting supervisor or the draftsman assigned to the project. He correlates the progress of the drafting.

In addition to this work he handles special assignments for the chief instrument engineer who may call upon him to carry on a study or survey. The job requirements for the classification of senior instrument engineer are the same as for the junior instrument engineer, except that he should have had approximately five years' experience in refinery or industrial engineering. This experience must include participation in industrial instrumentation covering the work described in the job description.

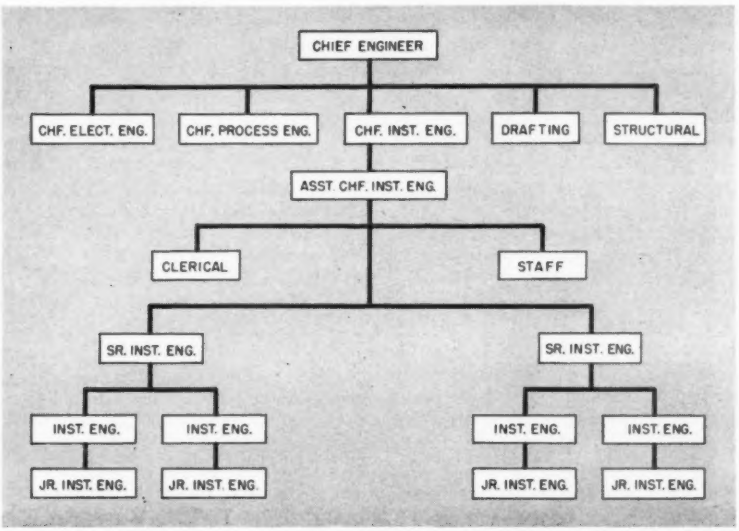


Fig. 2. Design or consulting engineering companies might have an organizational chart such as this, with chief instrument engineer reporting to chief engineer

This man must work in close harmony with job or project engineers. He must be able to interpret plant flow sheets and piping drawings in addition to explaining and sketching in order to clarify the assignments for the draftsmen and the men working under him. Depending upon the size of the company, this man may be in charge of the Department, and have all of the duties of a chief instrument engineer.

In a large department the senior instrument engineers are directed by the chief instrument engineer who has job and personnel supervision over all other classifications in his department. He must be able to carry on all the assignments of the men under his supervision. He discusses new jobs with the project man in order to decide general methods and policies as they affect the manner in which the Instrument Department will handle the job.

In addition, he reviews piping and instrument diagrams and makes his recommendations. He schedules jobs and supervises the progress of the men in his section. He analyzes the summaries of quotations and makes recommendations before they are submitted to his own management or the client.

Also, he checks and signs drawings, memos, Bills of Material and all the work of his section. He acts as a consultant on jobs under his supervision. Job requirements for this classification are the same as for the men under him except that it is normally desirable for this man to be at least thirty years old. He should have had approximately eight years' experience in work of a similar nature to that of men under his direction.

It is vitally important that he have the ability to work in close harmony with the other men in the engineering groups and that he be a leader and a teacher, in order to maintain morale in his division. He must be able to analyze piping and instrument diagrams and to minimize instrument installations which are not consistent with good practice. He must keep in close contact with the project men so as to be in a position to assist the men under him who are turning out instrumentation satisfactory to his company or client, and he must also maintain good standards.

He must be able to represent management in discussions with the client preliminary to the job and during the course of the job. He should be able to gain the confidence of his men so that they feel free to discuss instrumentation problems with him.

Where a department has several senior instrument engineers in charge of divisions, the chief instrument engineer would represent the Department. You will probably ask, "Who does the top man of the Instrument Department work for in the organization?" A book could be written upon this subject, and organization charts have been discussed about as much as major policies in a company. One answer to this question is: the closer this man sits to the policy-making group, the better he will function in connection with the design and development of a plant.

The following story might very well be translated into terms of instrument engineers and design groups: Years ago we told our instrument repair men to leave their tools in their pockets until they determined whether or not the operator was using the instruments in the proper manner. We found that we saved ourselves a lot of unnecessary work by making an analysis of operating procedures, rather than blaming the instrument every time.

Factor in Operation

One of the instrument mechanics came in from a particularly tedious and trying discussion with the operators with the comment that they had better turn over the operation of the plant to the instrument department because they were making all the decisions as to how the plant was run anyway.

This approach is a little radical, but we must recognize that proper instrumentation is becoming a very definite factor in the design and operation of practically every type of manufacturing unit. Again it is emphasized that the instrument engineer must have access to the policy-making group of the company because his activity encompasses all phases and his contacts are with all of the engineers in his group as well as with all of the specialists throughout the entire organization.

One salient fact stands out above all the other considerations. This is that the importance of instrumentation is increasing by leaps and bounds. It would be very difficult for a company which, upon analysis, realizes the necessity for instrumentation in any of its forms, to develop personnel and a department to cope with their problems upon the spur of the moment. We are moving so fast in our development of instrumentation—moving towards true automation—that we must give the men who are going to be responsible for this work the opportunity to lay the proper foundation so that they will be prepared to give the utmost assistance to their own companies.

How Planned Lighting Services Maintain Industry's Equipment

An efficient plant lighting system is indispensable to high-level production . . . To maintain this efficiency, it is important to have a planned lighting program . . . Author discusses some services available to industry

By **EDWARD I. CREED**, C & S Lighting Maintenance Co., Cleveland, Ohio*

ONE OF THE most important factors contributing to most effective modern industrial operations is proper lighting. And simple employment of the advanced techniques developed in recent years makes it relatively easy for plant management to provide the basic illumination needed to insure maximum visual efficiency on the part of production workers.

It is well established that good lighting installations pay for themselves many times over in reducing accidents; improving work quality; minimizing mistakes and rejects; increasing efficiency; improving inspection; providing for better employee morale; improving appearance, among other things.

There was a day when, though indispensable, lighting was not considered of great importance to industrial production. Ownership and operation of a lighting system was then an actual drain on profits: unavoidable, but invariably kept to a minimum value.

Today, an efficient plant lighting system is indispensable to high-level production. Providing a good plant lighting system is not sufficient in itself, however, to insure continued enjoyment of the many production advantages a properly designed system can bring. This can be guaranteed only if the basic system is subjected to a properly planned scientific maintenance program that makes certain the lighting system is kept in top-notch condition and working at maximum efficiency at all times.

A number of factors are involved. Not the least important of them is the fact that the aggregate foot candle level of any industrial lighting system suffers a continuous reduction in efficiency due to the accumulation of dirt on fixtures, lamps, ceilings, and walls since some types of accumulated dirt absorb, rather than reflect light.

Light efficiency is also reduced by the lumen depreciation of the lamps themselves. This reduction may range all the way from a 50 per cent loss, after 12 months, in the efficiency of a lighting system installed in an air conditioned tool and die shop, to a 50 per cent loss in a foundry during a single month.

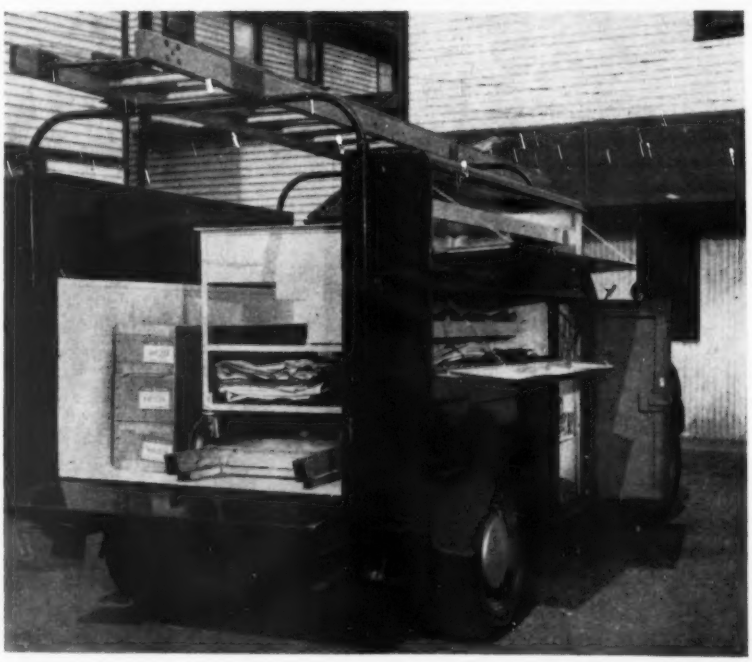
Presently the cost of providing proper lighting for a plant breaks down into two factors: the original cost of installation, which may be amortized; and the cost of electrical energy, replacement of lamps, cleaning, and other maintenance expenses.

Amortization of the original cost of a lighting system may be handled ordinarily on a six-year basis. Management is therefore safe from the standpoint of replacement. Operating and maintenance costs, however, go on and on, so it is in this area that money can be either directly saved or lost. It is also the area in which the full, original physical effect of the lighting system can be either maintained or partially nullified.

Planned lighting maintenance is the answer to getting the full affect of the illumination built into the basic plant lighting system and for realizing dollar-for-dollar value from the amount of power being consumed and paid for.

Inasmuch as poor maintenance can result in a 50 per cent light loss in as

Fig. 1. Here is one example of the maintenance equipment used by service companies. Truck has storage space for cleaning tanks, scaffolding, ladders, plus compartments for storing lamps, starters, ballasts and necessary hand tools



*Mr. Creed is also central vice president of the National Association of Lighting Maintenance Companies.

short a time as one month, it is easy to see just how expensive the lack of proper care can be in electricity alone. A lighting system giving only 50 per cent illumination, costs just as much as one giving 100 per cent efficiency.

Added to this, of course, must be such further losses as less light on the job, leading to slower work, more errors, a higher accident rate, and complaints; poor appearance due to dirty fixtures, burned-out lamps, blinking and swirling lamps, mixed colors of lamps, etc.; and the cost of extra repairs that would be eliminated by a program of preventive maintenance.

Fig. 2. These men are using special scaffolding to service lighting equipment. With such equipment, they can handle job during the plant's off-work periods

In the maintenance of a plant lighting system, perhaps the most important economic factor involved is setting up an adequate plan and devising a properly-timed schedule.

Such a plan can be worked out by a plant itself, with its own workers employed to carry out the details. It must be remembered, however, that when such a procedure is followed, a relatively large, experienced crew, properly equipped, is required.

Lighting maintenance is normally a periodic, rather than a continuous process so workers assigned to the maintenance crew must generally be taken off other tasks when the illuminating devices need attention.

It must also be borne in mind that special equipment is required for lighting maintenance, and expensive stocks of lamps, starters, and the like, must first be procured, then kept constantly on hand. The matter of the supervision needed to first plan the maintenance, then make sure it is done right can be another costly factor which should be considered in connection with lighting system maintenance using plant-employed crews.

Another approach to a planned maintenance program is the employment of a lighting maintenance company, or contractor, equipped with workmen, tools, and know-how to take over the responsibility of keeping the system in tip-top condition at a predetermined cost, delivering a guaranteed amount of light consistently, and generally doing it more cheaply than is possible through use of regular plant employees.

Such contractors are now located in most industrial centers. They are experienced in the scientific maintenance of lighting equipment and serve the industrial plant in a similar way to a window washing service (even though this type service does not require the technical know-how as does lighting maintenance), a long-accepted adjunct to manufacturing operations.

The program of planned lighting maintenance followed by these contractors is comprehensive and efficient. It consists of various preventive measures designed to provide maximum light at all times. Elements of the plan they follow include:

1) "Auditing" the lighting system to see how much it should deliver as against how much it is at present delivering to work areas.

2) Establishing the cheapest, most practical way to replace lamps, starters, and other parts.

3) Doing the work during a plant's off-work periods when possible.

4) Keeping the system clean with a minimum of time and effort.

5) Periodically checking the system to make sure no hidden damage is being done, and making needed repairs or replacements.

6) Removing from the plant's shoulders, time that would have to be spent in purchasing, paying for, and stocking all needed replacement parts.

7) Furnishing all labor-saving equipment to reach, test, repair, and clean a plant's lighting system.

Personnel employed by lighting maintenance contractors are experienced and efficient. Their electrical servicemen know all electrical lighting circuits and are thoroughly capable of making the necessary service checks and repairs.

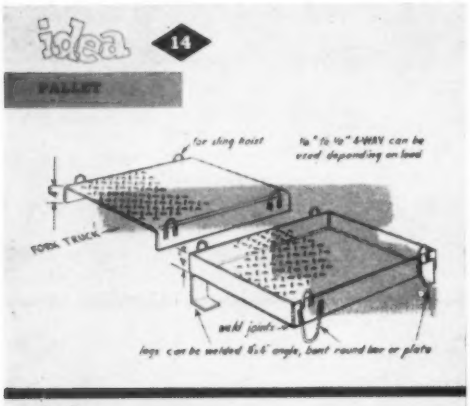
Cleaning crews are normally chosen for finger dexterity and physical stamina. They are able to disassemble and reassemble any type of fixture, as well as change lamps and starters. They follow a definite procedure embodying the most efficient cleaning methods. Supervision is constant and meticulous.

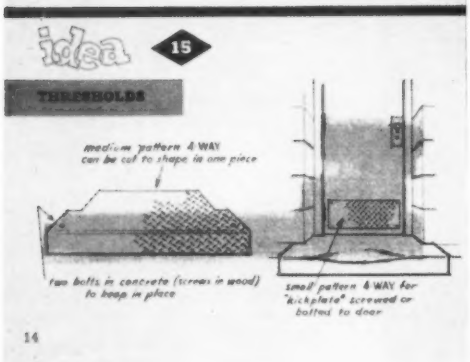
Special maintenance equipment is used, with trucks employed usually having storage space for cleaning tanks, scaffolding and ladders, plus additional compartments for lamps, starters, ballasts, hand tools, and the like. It is also normal procedure for each truck to carry a complete stock of material for servicing the plants it visits. Some contractors even employ two-way radio to facilitate operations.

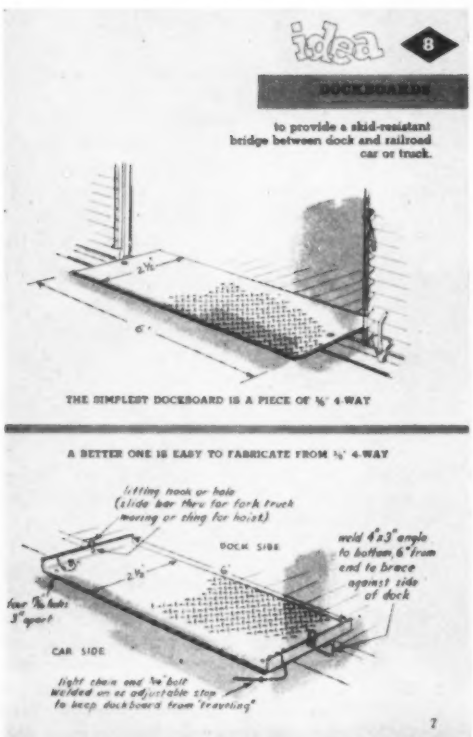
Lighting maintenance service is provided on a contract basis, with remuneration depending on the time spent at a given plant; it is well to note that the experience and know-how of the crews employed guarantee keeping this time at a minimum.

It is also true that because the trained manpower and specialized equipment used by the lighting maintenance contractor is divided among all his customers he can almost invariably service a plant's lighting system at less cost than would be involved if the plant employed its own crew and equipment for the same job.

18 Ideas for Plant Use of Steel Plate




idea 15
THRESHOLDS
medium pattern 4-WAY can be cut to shape in one piece
two bolts in concrete (screws in wood) to keep in place
small pattern 4-WAY for "kickplate" screwed or bolted to door
14


idea 8
DOCKBOARDS
to provide a skid-resistant bridge between dock and railroad car or truck.
THE SIMPLEST DOCKBOARD IS A PIECE OF ¼" 4-WAY
A BETTER ONE IS EASY TO FABRICATE FROM ½" 4-WAY
lifting hook or hole (slide bar thru for fork truck moving or sling for hoist)
DOCK SIDE
weld 4"x3" angle to bottom, 6" from end to brace against side of dock
four ⅞" holes 3" apart
CAR SIDE
light chain and ⅝" bolt welded on as adjustable stop to keep dockboard from "traveling"
7

Another example of the excellent helps for plant engineers now being made available by nearly all manufacturers

LAST MONTH WE conceived what we considered to be a brilliant idea: Giving long-overdue recognition to manufacturers for the time and money they spend in disseminating ideas, information and help on their products. For a long time these bulletin descriptions have been confined to the rather prosaic—by necessity—pages in the back portions of the magazine. That section is still there, so when you're through here why not take a look at the Bulletins and Data File departments.

This month our featured booklet, illustrated here, deals with some mighty clever and practical ideas on the use of steel safety floor plate in small tool tables and machinery platforms.

Want a Copy?

If you would like a copy of this booklet, produced by Inland Steel Company, just drop the editor a line, or write "18 Ideas" on the postage-paid card elsewhere in this issue and mail it to us.

Three ideas are at left. How to work steel plate is seen at right

FASTENING METHODS
DRILLING AND PUNCHING — When used as flooring over wooden joists or concrete floors, holes may be cut in the plate through which fastening bolts or lag screws are inserted and fastened to the base material. The holes may be drilled, punched or cut with an oxygen torch. When drilled, the entire plate should be turned over and the hole can be countersunk if desired.
WELDING — 4-WAY Safety Plate may be welded with ease using conventional processes. Many designers and architects have taken this fact into consideration and have made it perform double duty as a safety flooring material and as an integral, structural part of a machine or building. For floors it may be tack welded to supporting steel members.
WORKING WITH
SAFE UNIFORM LOADS (in lbs. per sq. ft.)
CUTTING
FLAME CUTTING
SHEARING — 4-WAY can be sheared to ease with any conventional plate shear and the 4-WAY design permits shearing to extremely close tolerances.
SAWING — 4-WAY Safety Plate may be cut by power hack saws or steel-cutting band saws to any practical shape.
FORMING
Most simple shapes can be formed with ease with regular fabricating equipment. Uniformity of pattern prevents deflection while piece is being bent. Allowance should be made, when adjusting the fabricating equipment, for the extra thickness and increased strength due to the raised lugs.
18
19

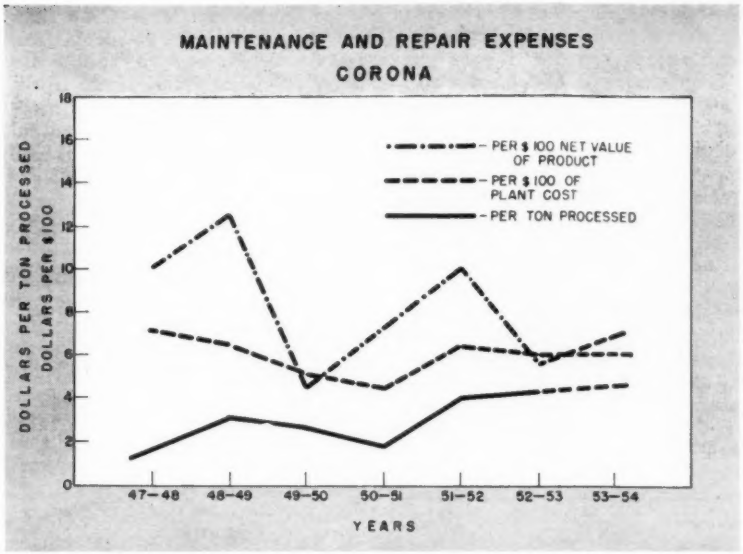


Fig. 1. Graphical representation of maintenance and repair cost comparisons

COMPARISON OF R&M COSTS

ITEM	ELP— 52 / 53
R&M COST / SALES	2.06 % (COVINA & CORONA)
R&M COSTS / FIXED ASSETS, INS. VALUE	6.3 %
R&M BLDGS & GRNDS / TOTAL R&M COSTS	8.0%
MAINTENANCE PAYROLL / PRODUCTION PAYROLL	14.3 %
AVE. MAINT. EMPLOYEES / AVE. PROD. EMPLOYEES	13.4 %
MAINTENANCE LABOR / TOTAL R&M COST	63.0%

Fig. 2. Percentage comparison of costs

Lemon Processing Gives Maintenance the Acid Test

Author cites unusual considerations necessary to maintenance planning encountered in food processing . . . Originally presented at first Western Maintenance Conference, article details organizational setups and procedures . . .

By J. S. HUTCHISON, Chief Engineer, Lemon Exchange Products Company

BASICALLY, MAINTENANCE in one industrial plant is similar to that in any other plant, but food processing presents some unique problems.

In our particular plant—plants, actually, since the Company maintains two—lemons are processed, primarily into frozen lemonade concentrate. The two plants, both in California, have a combined floor area of 528,000 sq ft, with 23 buildings at Corona and 11 at Covina.

The main plant is at Corona, and service facilities are supervised from this plant. Activities of the Maintenance and Mechanical Department at Corona are organized as described below, and typical examples of their daily routine will best present some of the unusual problems encountered in our field of industrial production.

F. P. McCormack, Plant Engineer, is in charge of this department, reporting to the Chief Engineer at executive staff level. An assistant plant engineer, a chief clerk and a secretary and one record clerk constitute his office personnel.

There are 63 employees on general maintenance work; in addition, 26 employees do millwright and construction work and 21 operate the utility and service facilities in the plant. Work is directed by foremen (each of whom has an assistant) in the following shops: Machine and Tin Shops, Pipe Shop, Electric Shop, Carpenter, Millwright and Paint Shops. The plant engineer also supervises the boiler house, water supply, electric power, air distribution, waste disposal, and the operation of refrigeration equipment.

Our plant, being of modest size, has only one area which warrants mechanics of its own. Equipment in the Juice Products Building is rather specialized, so we have a mechanic in charge and two shift mechanics on each shift. These men have been factory trained in repairing can sealing machines. All ordinary maintenance is handled by these men. However, all shops are subject to call by the Juice Department mechanics in case of a major job.

Maintenance Inspections, Scheduling

Inspection of the machinery in the rest of the plant is made by three shift mechanics, one on each shift. A millwright inspects every conveyor in the plant daily. The two oilers, on the day shift, also inspect all equipment as they make their rounds, which cover roof to basement of most buildings.

Inspection findings are reported to the plant engineer on a form stating equipment inspected, condition, and the mechanic's recommendation. The more serious conditions are re-inspected by the assistant plant engineer. If at all possible, repair work is deferred until a shut-down can be scheduled to coincide with light fruit receipts.

All repair work is reported, detailing all pertinent data. Signed by the mechanic, the form must be initialed by his foreman, to indicate his knowledge of the repair, and then it is

routed to the plant engineer. Another form shows changes such as speeds and sizes, as well as a description of new equipment installed for items removed.

Problems of Lubrication

It is most important in a food processing plant that proper precautions be taken to prevent contamination of the food product. A major step in that direction was taken in 1952, when we installed 13 centralized lubricating systems. These were located on the two lemon washers, and on various lemon conveyors and elevators. There are as many as 150 bearings on some of the installations, ranging in size from 5/8 in. to 1-15/16 in. in diameter. This system keeps the oilers off the equipment, and since we use oil instead of grease, the bearings remain clean and there is no waste. One man, in one hour, lubricates well over 2,000 bearings with the system, whereas with individual grease fittings it would require four man-hours.

The —40 F temperature in the freezer tunnel creates a difficult lubricating problem, but by using all-purpose grease, sub-zero type, mixed with an additive in the proportion of two ounces per pound of grease, we have not had one failure. All bearings in the tunnel are thoroughly cleaned, flushed and re-packed once a year.

Where actual contact may exist between juice products and a lubricant, a white petroleum grease is used. Garlock lattice-braid flax packing with paraffin lubricant is used in agitator stuffing boxes of mixing tanks.

All oiling, except for electrical motors, is done on the day shift by two oilers. All electrical motors in the plant are oiled by electricians.

Utilities

Six boilers, with 1175 hp, can easily handle all normal loads, which amount to about 60,000 lb per hour. In addition to the usual daily routine operations such as soot blowing, feed water and make-up water testing, checking oil burners, instruments, each boiler, furnace, and auxiliary is thoroughly inspected every 4,000 hours of operation. This includes repairs to fire boxes, tube cleaning inside and out, inspection of all valves, traps, and drums. All repairs are reported, giving type of repair, time required and labor, as well as the time the boiler went off the line and the time it is ready for steaming again.

All electric power is purchased from the California Electric Power Company, which has a total of 3900 kva transformer capacity, 34.5 kv to 4160 volts feeding our outdoor metal clad switchgear. We have eight unit substations, the largest of which is 1500 kva, serving the heavy refrigeration load. Twenty-five control centers distribute power to individual motors.

Most of our buildings are equipped with automatic sprinklers. We do our own inspecting and testing of this equipment; in fact, we have designed and installed some of the building sprinkler systems, adhering to the rigid regulations laid down in the NBFU Red Book. Our plant fire chief spends four hours per week inspecting all types of fire fighting equipment.

Air is furnished all buildings at 35 psi for various uses. Instrument air is supplied by small compressors where needed and is dried by silica gel driers of our own design and make. Air is used to operate the heavy insulated sliding doors in the refrigerated warehouse. In this application, if the slightest amount of moisture remains in the air, it will frost up the lines, making the doors inoperative. Considerable maintenance has occurred at this station.

Building Maintenance

Inspections are made monthly of all roofs, windows, gutters, painting and floors. We have 36,000 sq ft of floor covered with hot mastic, 1¼ in. thick. This material has proven quite satisfactory for many years, as long as acid or juice is kept from the concrete below. Since the mastic will not support heavy loads, equipment legs penetrate the mastic in order to rest on the concrete, and this condition requires constant attention.

In recent years we have installed quarry tile floor in two of our juice processing buildings. These floors are by far the best in the plant, and though costly to install, are easily kept clean and always look immaculate.

Repair and Maintenance Costs

About 30 days prior to the closing of our fiscal year, budget worksheets, Fig. 3, are furnished all department supervisors. These indicate the tons of fruit processed yearly, and the cost of R & M during those years, for the previous five years. The expected fruit receipts for the ensuing year are shown, and space for the estimated R & M costs is provided. With the fruit crop dependent on the weather, which is unpredictable even in California, it is extremely difficult to predict fruit receipts and their affect on R & M costs. However, last year our R & M budget was over-spent by only 1½ percent.

Refrigeration Equipment

Although we have a number of small and medium sized vertical, single acting ammonia compressors in various departments, the equipment in the juice products building consists of York V/W machines on both single stage and second stage service. The Booster stage machines operating at —50 F. (14.3 in. Hg.) and —30 F. (1.6 in. Hg.) are York rotary machines.

The low suction pressure of the —50 F booster stage is occasioned by the severe duty imposed upon it by the freezer tunnel in which air at —40 F is blown downward through one, two, or three layers of cans of concentrate for lemonade. These cans travel on wire belts, running one above the other, and in about one hour's time are reduced from a temperature of 18 F to 0 F, passing

BUDGET WORK SHEETS FOR 1953-54 FISCAL YEAR

BUDGET FOR: REPAIRS & MAINTENANCE

DEPARTMENT: SERVICE

ESTIMATED TONS TO BE PROCESSED IN 1953-54

150,000 Tons

DEPARTMENT ESTIMATE OF DOLLARS TO BE SPENT IN 1953-54

TOTAL	Steam Generation	Electricity	Gas	Water	Shops
	7,700.00	2,800.00		3,800.00	5900.00

EXPLANATION FOR SPECIAL ITEMS:

F. P. McCormack,
DEPARTMENT SUPERVISOR

RECORD OF TONS PROCESSED IN PREVIOUS YEARS

YEAR	TONS Rec.
1952-53	135,000
1951-52	101,478
1950-51	130,911
1949-50	66,718
1948-49	67,357

RECORD OF DOLLARS SPENT IN PREVIOUS YEARS

TOTAL	A/C 12	A/C 13	A/C 14	A/C 15	A/C 18
14532.92	5895.37	1116.40	—	1911.59	5609.56
16685.68	8025.83	886.91	—	2909.68	4863.26
12604.14	4937.59	440.50	—	1788.07	5433.98
13995.06	6498.22	1548.18	—	2343.95	3604.71
15433.94	7020.17	994.61	—	3004.18	4394.98

* Aug. Sept. & October 1953 estimated

Fig. 3. Typical budget work sheet used in forecasting individual department costs

through the slush-freezing state. This operation requires about 155 tons of refrigeration.

The maintenance inspection schedule was determined by comparing our V-8, V-12 and V-16 machines with an automobile engine. With a piston speed of about 575 fpm, the compressor compares with an automobile engine traveling at 25 mph. When our log indicates a machine has operated 4000 hours, comparing with about 100,000 miles on the automobile engine, the cylinder heads and crankcase covers are removed. A physical inspection of valves, seats, sleeves, connecting rods and crankshaft is made.

Upon completing 9000 hours, each machine is completely dismantled except for the crankshaft and seal. All valves are changed and the seats resurfaced. Pistons and sleeves are checked for diameter and out-of-round. The crankshaft is "miked" for wear and checked for scoring and cracks. The crankcase is thoroughly cleaned, oil lines are blown out and flushed with mineral spirits. All gaskets are replaced and fresh ice machine oil is added. Our maintenance cost on these V/W machines runs about 10 cents per thousand ton hours.

Fork Lift Trucks

We have five electric trucks, four 3000 lb- and one 7000 lb-capacity, and four gas trucks. The maintenance costs, which include battery changing run considerably higher on the electrics, due to battery damage, contact and commutator wear and brush trouble. It requires about 40 minutes at the end of each shift to change the five batteries. Altogether four man-hours per 24 hours are spent on minor repairs, charging and changing batteries.

Corrosion and Construction Materials

Natural strength lemon juice, with a pH of 2.3, the acidity being principally citric acid, presents difficulties in handling. Wood pipe and tanks, lead-lined vacuum pans and sheet lead covered floors were prevalent during the 1920's for the manufacture of citric acid. Vitrified clay pipe was and still is very satisfactory for plant waste material, so long as the lines are under little or no pressure.

Now, all of our juice products are handled in type 304, 316, and 317 stainless tanks, piping, fillers, slush-freezing equipment and evaporators. No paint is required on these shiny stainless steel surfaces, which contributes immeasurably to easy cleaning. Excellent results have been obtained with Saran pipe and fittings and Olivite pumps in the Pectin Department, where the liquors contain a small quantity of hydrochloric acid. The valves here are flanged cast iron plug cocks. Many tanks throughout the plant are steel, rubber lined, though we still use many wooden tanks.

Pumps vary in the different departments. Juices are pumped with pumps of type 304 stainless steel and high nickel alloy. The Lo-Temp evaporator is equipped with Worthite pumps for pumping pectin liquors containing diatomaceous filter aids, we use electric steel foundry alloy 32, heat treatable impellers and bodies of type 316 stainless. On a trial basis, we have used Uscolite pipe and just recently we installed about 150 ft of 6-in. Fiberglas pipe handling plant waste water with a pH of 3.8.

Waste Disposal

Until recently, the liquid effluent resulting from handling the spent lemon peel, which contained some juice, oil, citric acid, pectins and particles of cellulose, with a pH of 3.8, was ponded in a rotating pattern. These ponds showed decreasing permeability and we adopted another method which utilizes a spreading area. This area consists of a small amount of top soil laid over sand and gravel. The ground was check-furrowed and the effluent allowed to flow in at a rate which the soil would absorb, without overflowing the furrows.

As one strip became saturated, the adjoining strip was utilized. After drying for a few days, the soil was plowed, allowed to stand, then made ready for effluent again.

After eight or ten cycles, fresh water was run on the land and oats were sowed, using fresh water for irrigation. After the oat crop was harvested, the land was again prepared to receive effluent. The spent peel is now ground, dewatered, and dried for use as cattle feed.

Sanitation and Clean-Up

The plant sanitarian, a member of the technical staff, in company with the sanitation foreman, department operating foreman, a helper and a chemist, makes an inspection of each department about once a month. A six month general inspection is made of grounds, shops and stores. The purpose is to observe efficiency of cleaning and methods, tidiness, safety conditions of equipment, sources of contamination, and anything else concerning sanitation.

All cleaning, except a few special jobs, is performed by the operators in the various departments. Nine janitors maintain the offices throughout the plant.

Maintenance is an ever present problem with us at Corona. We believe a good job is being done, yet we are alert for improvements.

Fig. 4. Front and back of equipment card used at Exchange to record repairs

When to Install a Powered Adjustable Ramp

When does it pay to have a powered adjustable ramp? . . . What characteristics should it have? . . . Review conditions in your plant, says the author, and make a transfer cost analysis

By C. W. CHOROMANSKI, Rowe Methods, Inc.

TOO OFTEN, THE receiving and shipping dock of a plant becomes a bottleneck simply because no efficient means is used for the transfer of material between dock and vehicle. The inefficiency is almost always a result of height differential.

Most common method of bridging the space between dock and vehicles of differing heights makes use of simple bridge plates. This equipment is not always successful however, because of steep slopes which may result if the height differential is severe. A manually-propelled truck, for example, operates at top efficiency on a level plane, or up a nearly flat slope. The capacity handled falls off sharply when a grade is encountered, as shown in Fig. 1.

It is possible to reduce the degree of incline by lenthening the bridge plate itself. In such a case, the plate would have to be long enough to provide a relatively flat slope, and at the same time, strong enough to support heavy loads.

A solution to the problems indicated, is provided by the powered adjustable ramp. It is designed to adjust to any required height, to make greater lengths and more gentle slopes feasible because of its powered operation. This type ramp is engineered to lift the empty deck, and to hold a full load; it is fitted with a hinged bridge plate at the forward end.

When powered platform or fork trucks are used, the slope may be steeper than that for manually-operated trucks. The angle of slope in determining the length of the powered adjustable ramp is governed by the wheel base and underclearance of the equipment used. Where light highway equipment is worked, or a shop truck is extra heavy (or if a loaded shop truck exceeds 50 per cent or more of capacity of the rear axle of the highway carrier), a floating action is desirable in the powered ramp. This is vital to give smooth operation and to compensate for sag and rebound of the truck bed.

Floating action permits the ramp to raise and lower with the truck bed as a load passes over. It also insures alignment at all times during loading or unloading.

With fork trucks, particularly of large capacity, the sag and the rebound are intensified during loading. When loaded, most of the combined weight is carried on the front wheels of the fork truck and as the rolling load passes from a solid dock to the bed of the motor truck, the spring and tire deflection combine to create a sag of as much as 5 in.

The powered adjustable ramp has layover arms or a lip which rests on the truck, with provision for releasing the lift mechanism so that it can float or move freely up and down with the sag and rebound of the truck.

Where the nature of the cargo handled does not permit the use of layover arms, a full load adjustment type of unit is supplied. Such a unit is not as fast, however.

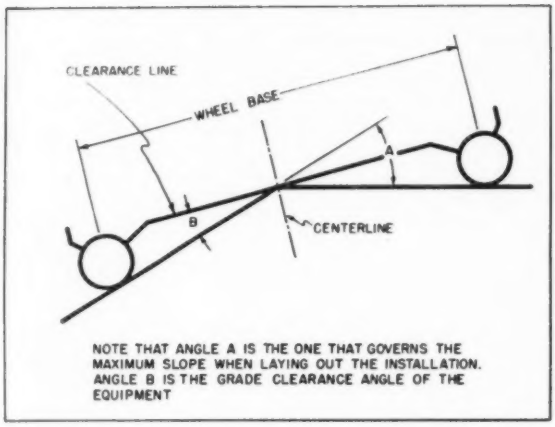

CLEARANCE LINE
WHEEL BASE
A
B
CENTERLINE
NOTE THAT ANGLE A IS THE ONE THAT GOVERNS THE MAXIMUM SLOPE WHEN LAYING OUT THE INSTALLATION. ANGLE B IS THE GRADE CLEARANCE ANGLE OF THE EQUIPMENT

Fig. 1. First step in choosing correct model of adjustable dock

Determine maximum angle of bridge that can be accommodated by clearance of handling truck. This can be done by drawing its outline as shown so that center line of clearance line is at the point where the hinged bridge would contact the level loading platform. Another line is then drawn from the same point to the bottom of the lower wheel. Angle B then represents the grade clearance angle of the equipment. Angle A (twice the width of B) represents the total maximum angle that can be accommodated for bridge by limitations of handling equipment.

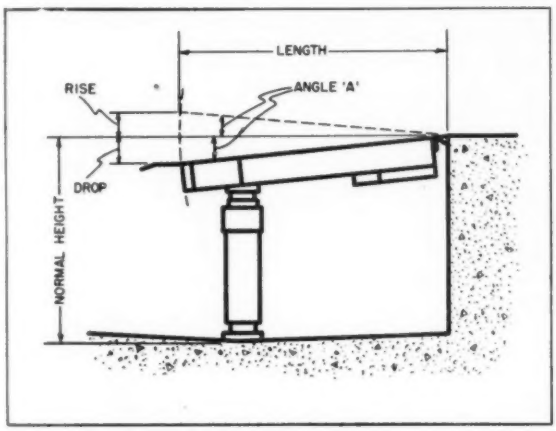


Fig. 2. Second step determines the correct length of bridge

Length of bridge to be used between the different heights of the carrier's platform and the loading dock must be great enough so that Angle A below the level line, or the same Angle A above the level line, will be less than the Angle A limitations determined in Figure 1. Also, note that the longer the length of the bridge (and the shallower its consequent angle) the greater the load accommodated within the limitations of drawbar power.

First to consider when planning for the installation of adjustable dock ramps is the adjustment range desired above or below the existing dock. With this information, selection of the proper length ramp for most efficient operation is simplified. The next point to consider is the nature of the handling equipment itself. The lower the power of the unit, the more gentle must be the slope of the ramp.

Grade clearance and wheel base of handling equipment to be used is another important factor in such planning. Generally, a good, powered, adjustable ramp, properly selected, correctly installed, will have the following features:

1. Low installation cost.
2. Weather-proof construction (if located outside).
3. Ability to support rolling loads off-center or for cross travel. In addition, a high safety factor is of great importance.
4. Ability to operate efficiently at lowest temperatures.

(Continued on page 198)

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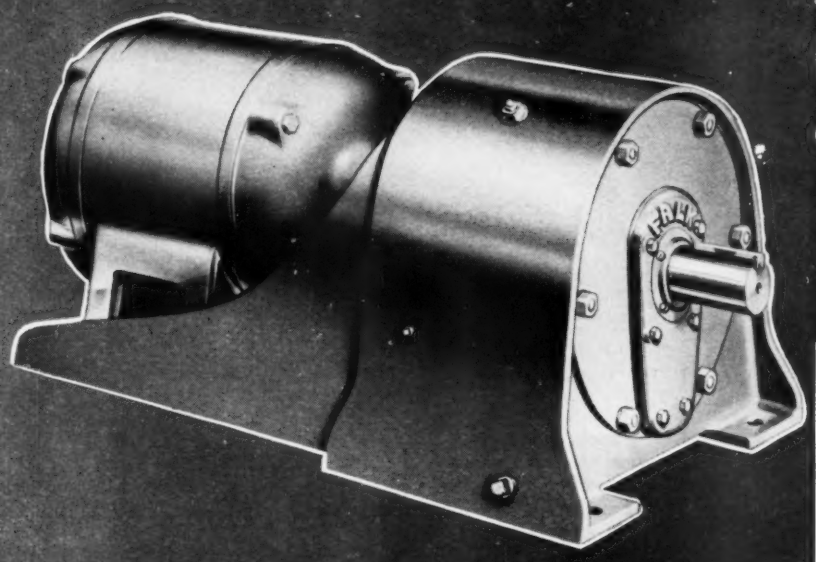

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When you choose a FALK All-Motor type Motoreducer, you get the utmost in design, versatility of performance, and utility—plus the greatest possible dollar-for-dollar value throughout its traditionally long life... Available in any standard ratio from factory and distributor stocks throughout the country. Write for Bulletin 3104.

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1 **All-steel Housings.** Unbreakable, strong, rigid. Generous overhung load capacities provided by wide bearing spans, large shafts and bearings.

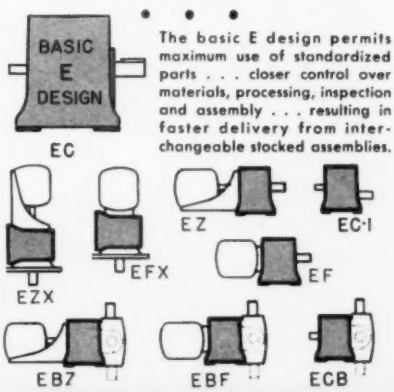
2 **Streamlined inside and outside.** Smooth, clean surfaces; machine welded construction conforms to NEMA motor frames.

3 **Sealed Housings.** Dual closures and one-way vents keep oil *in*, dust and moisture *out*. Units are splashproof, leakproof, dustproof.

4 **Positive Lubrication.** Large sump capacity ...oil-tight construction assures clean lubricant...direct dip of revolving elements provides positive lubrication at all speeds.

5 **Wide Speed Range.** Selective ratio combinations provide output speeds from 1.5 rpm to 1430 rpm with stock gears.

6 **Precision Gearing.** Heat-treated alloy steel, precision cut and shaved helical gearing throughout...quiet-operating crown shaved pinions...taper bored gears for easy ratio changes.



The basic E design permits maximum use of standardized parts . . . closer control over materials, processing, inspection and assembly . . . resulting in faster delivery from interchangeable stocked assemblies.

WRITE FOR BULLETIN 3104

Prefabricated Steel Building for Storage Set on 25-Ft Concrete Foundations

A NEW STORAGE AND OPERATIONAL building at the South Point, Ohio plant of the Nitrogen Div., Allied Chemical & Dye Corp., has been built with an unusual structural feature. A 14,400 sq ft standardized steel building, produced by Luria Engineering Co., has been set on 25-ft-high buttress walls of reinforced concrete. Normally, steel-framed buildings of this type are erected on ground-level foundations. In this case, proposed storage of a huge sloping pile of bulk product required heavy walls to withstand stresses caused by weight of the material.

The steel-framed portion of the 120-ft-long building is 23 ft high to the eaves and has two 60-ft clear span bays, providing maximum unobstructed area for storage.

Coil Design Gets Thorough Temperature and Capacity Check in Laboratory

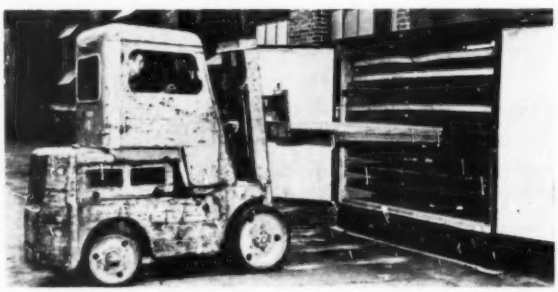
PREPARATIONS FOR TESTING a new coil design in an air tunnel set up in the Trane Research and Testing Laboratory, La Crosse, Wisconsin, include the work of a technician adjusting the thermocouples that electrically measure the temperature differences across the coil face.

When a coil design is set up for thorough testing in the laboratory, as many as 90 different temperature readings are taken in a single test on this 18-in. by 120-in. coil, one every few inches across the face of the coil surface. The bell mouth of the air tunnel provides uniform velocity to the air as it enters the test coil section. Additional measuring instruments, set up on the same test coil, will give the engineers values for capacity of the coil, enabling them to predict the volume of air that can be handled.

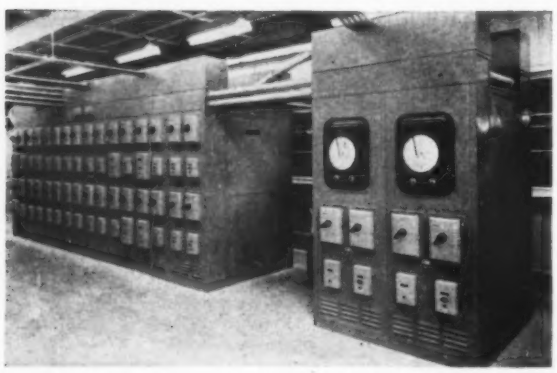
Two-Way Rack Eases Storage and Handling of Sheet Metal

BECAUSE IT WAS DIFFICULT for a fork truck to operate in a crowded shop, an East Coast shipyard made an unusual rack for the storage of sheet metal. The rack, which consists of 10 steel trays on which the metal sheets rest, extends through the wall of the metal fabricating shop. Each tray can be inserted or removed from the outside by a fork truck. The rack is enclosed in a cabinet.

Inside the building, the rack is open so that individual sheets can be removed easily, as needed. The rack offers a central storage space which can be serviced in a few minutes. The fork truck, made by Clark Equipment Company, is then freed for other duties in the yard.



Control System Automatically Regulates Solvent Flow for Paint Viscosity



IN A NEW FLOW-COATING installation for electric range parts at the General Electric Co. plant in Louisville, Ky., Norcross Viscometers are used to automatically record the paint viscosity. A reading is taken every three minutes on the viscosity of the paint supplying the coating equipment, and when it increases excessively, because of the evaporation of the solvent, the Viscometer triggers the opening of a solenoid valve. This valve permits the flow of the necessary solvent make-up to maintain viscosity.

Flow coating is inherently an efficient method of applying paint or enamel, because of the possible savings that result, and accurate control of viscosity and other factors affecting quality now permit the use of flow coating where a good finish is required. The Viscometer, made by the Norcross Corporation, meets the requirements for mass production painting at controlled viscosity.

Wagner®
ELECTRIC MOTORS
...the choice of leaders in industry

SAVE maintenance dollars with Wagner Fan-Cooled Industrial Motors

HERE'S HOW—

the Wagner Cartridge Bearing Design cuts your maintenance costs:

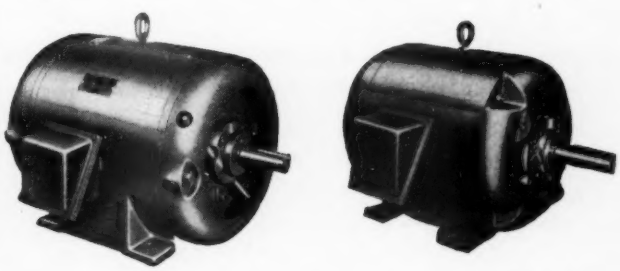
Bearings are protected at all times. The Wagner design completely encloses the bearings in a sealed cartridge. Labyrinth seals prevent the entrance of water, dirt and other foreign material. Even when the motor is disassembled, the cartridge remains intact as part of the rotor shaft. The bearing housing stays completely enclosed for full protection against dirt and dust.

Wagner Bearings can be relubricated. When lubrication is necessary to forestall premature bearing failure in unusually severe applications, readily accessible lubrication openings permit addition of grease or complete relubrication.

Wagner Bearings run longer between grease periods. Hot bearings shorten grease life. Wagner bearings have a low temperature rise because the design incorporates a deflector shield that directs a cooling stream of air around the bearing housing. Bearings run cooler and longer between maintenance periods.

This cartridge bearing design is a feature of the entire Wagner line of totally-enclosed fan-cooled motors. The line includes standard and explosion-proof steel frame motors, and standard and explosion-proof cast iron frame motors. All types are available with normal torque or high torque characteristics, in ratings to 250 hp.

For complete information—just call the nearest of our 32 branch offices, or write for Bulletins MU-132 and MU-196.



Wagner Electric Corporation EST. 1891

WAGNER ELECTRIC CORPORATION
6492 PLYMOUTH AVE., ST. LOUIS 14, MO., U.S.A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

ELECTRIC MOTORS
TRANSFORMERS
INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

MS4-16

For more facts circle 563 on Reply Card

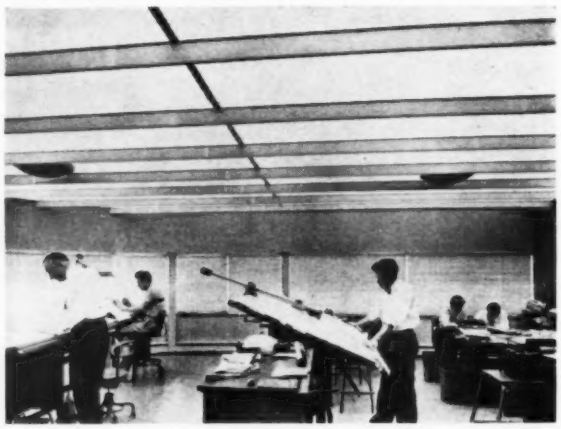
Luminous Ceilings Provide Shadowless Light for Engineering Draftsmen

A COMPLETELY LUMINOUS ceiling, producing a high intensity light that is free from shadows and glare, has been installed in the engineering drafting room of the Stimsonite Plastic plant, division of Elastic Stop Nut Co.

Covering 730 sq ft, the ceiling consists of thin, translucent corrugated sheets of plastic suspended on metal tracks below conventional fluorescent light fixtures. This has permitted the original ceiling height of 15 ft to be lowered to a more desirable lighting level of 9 ft 6 in. Between 70 and 80 ft-c of uniform, diffused light are maintained.

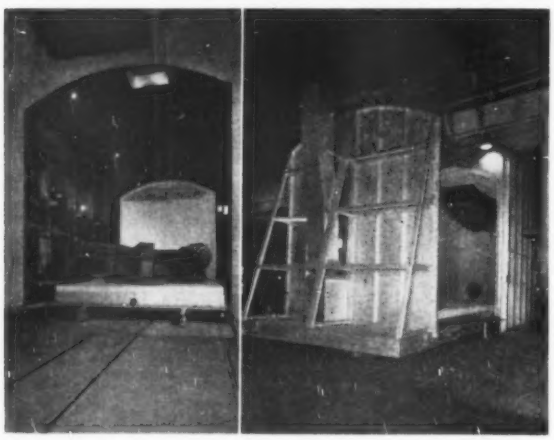
Tests by Underwriters' Laboratories show that the plastic will soften, but will not burn by itself, thus making it possible to install the ceiling beneath the sprinkler system. In the event of fire, the plastic will lose its corrugation at 140 F and drop from the metal tracks before the sprinkler system is set in operation at 165 F.

The ceiling is made by Luminous Ceilings, Inc., Chicago.



Mammoth Heat Treating Furnace Features Internal Duct Work

A CAR-TYPE HEAT TREATING FURNACE has been installed at the East Pittsburgh, Pa., works of the Westinghouse Electric Corp., for stress relieving large weldments. In the fully usable charge space—30 ft long, 18 ft wide and 16 ft high—single or multiple parts weighing up to 100 tons may be treated at one time.



The furnace was designed for a maximum operating temperature of 1600 F, but stress relieving will be performed at about 1175 F. The front door of the furnace, as well as the floor, rides on 20 car wheels, on four parallel railroad type tracks.

Mounted near the top and behind the furnace chamber itself is a refractory-lined combustion chamber. Four burners, with a rating of 7 million Btu per hour, will fire into the chamber. The air passing through the combustion chamber is heated by the burning gas, and enters the furnace from the rear through ducts suspended from the ceiling, which distribute it throughout the charge space.

To complete the cycle, air is drawn out of the furnace through two recirculating blowers. Duct work then directs the air flow upward to the combustion chamber, then back into the furnace chamber. This method of firing and the use of internal duct work prevent hot spots in the charge space and eliminate the need for overhead space above the furnace roof. A program control regulates the cycle.

Magnetic Measuring Equipment Fills New Testing Laboratory

ONE OF THE MOST MODERN laboratories for measuring and analyzing magnetic materials is functioning at the Carboloy Department plant of the General Electric Co., in Detroit. It affords the engineering section every type of equipment for measuring magnetic fields.

The facilities enable engineers to check designs, measure performance and efficiency of equipment in which Carboloy products are used, establish standards, calibrate precision magnetic assemblies and evaluate new magnetic materials.

Installations required to do this work include magnetizing and demagnetizing equipment, stabilized power supplies, basic machine tools to allow construction of magnetic circuit components, automatic equipment for recording hysteresis loops, and facilities for developing high speed test equipment for production line use.

Complete facilities are available for metal work, woodworking and electric circuitry. A recording hysteresigraph, which automatically makes a complete record of a magnet's entire hysteresis loop, is among the laboratory's major installations that makes possible complete study of a magnet.

New G-B

SNAP*ON

PIPE INSULATION

SIZES?

Large or small, we have them ALL!

Good news! G-B Snap*On Pipe Insulation is now available in a complete range of sizes and thicknesses for piping from ¾" to 24" in diameter. It is also available plain or with factory-applied vapor barrier facing. Now you can insulate hot and cold pipe of all sizes with this unique one-piece insulation molded of feather-light glass fibers!

"One-piece". . ."feather-light"—just picture what these characteristics mean in **savings.** They mean that one man can easily carry complete sections to the job . . . quickly snap them over pipe . . . quickly secure them with staples . . . easily paint or finish them as desired.

And due to the outstanding thermal efficiency of G-B Snap*On (K factor of .23 at 100° F. mean) you enjoy an important "second saving." For any given wall thickness, G-B Snap*On prevents more heat or cold loss than any pipe insulation on the market. Or to look at it another way, now you can use pipe insulation of thinner wall dimensions than you ordinarily use—and still achieve, or improve, thermal efficiency.

Seeing is believing—write today for samples and new 8-page brochure with complete descriptive and technical data.

gb

GUSTIN-BACON MANUFACTURING CO.

244 W. 10th STREET KANSAS CITY, MISSOURI

For more facts circle 564 on Reply Card

NEW PLANT CONSTRUCTION — advance information on location, costs

Prepared by Le Roy W. Allison

East Los Angeles, Calif.—California Container Corp., 2001 East 57th St., Vernon, Los Angeles, corrugated paper boxes and containers, has plans nearing completion for new one-story converting plant, about 360 by 480 ft, at 2601 Malt Ave., East Los Angeles. Cost reported approximately $1,500,000. Work is scheduled to begin soon.

Denver, Colo.—Gates Rubber Co., 999 South Broadway, automobile tires and tubes, mechanical rubber goods, etc., has plans for two-story addition, about 215,000 sq ft floor space. Larger part of structure will be equipped for production service and remainder for storage and distribution. Cost reported about $1,000,000. Work is expected to begin this fall.

Milford, Conn.—Bridgeport Thermostat Division, Robertshaw-Fulton Controls Co., 1225 Connecticut Ave., Bridgeport, Conn., thermostats and parts, metallic bellows, etc., has plans for new branch plant at Milford, to be one-story, about 150,000 sq ft floor space. It will be equipped for large, increased capacity. Proposed to begin work soon. Cost reported about $1,300,000. Leo F. Caproni, 1225 Chapel St., New Haven, Conn., is architect and engineer. Main offices of company are at Greensburg, Pa.

Savannah, Ga.—Verney Corp., Manchester, N.H., rayons and other synthetic fabrics, plans new mill in Richmond Hill District, Savannah, where large tract of land has been acquired. It will comprise a group of one-story buildings, equipped to give employment to more than 800 persons. Proposed to begin work soon. Entire program will represent a reported investment of over $1,500,000.

Chicago, Ill.—Campbell Soup Co., 2550 West 35th St., canned soups, frozen soup products, etc., has plans for new one-story addition to local factory, about 140 by 200 ft, to be used for processing and production of frozen soups. Cost reported over $500,000. Plan to begin work this fall. Battey & Childs, 231 South LaSalle St., Chicago, are architects and engineers. Main offices are at Camden, N.J.

Lincolnwood, Ill.—Ditto, Inc., 2243 West Harrison St., Chicago, Ill., duplicating machines and parts, will soon begin foundations for new plant at Lincolnwood, near Chicago. It will comprise a main one- and two-story building, 500 by 760 ft. Project will provide for large, increased capacity and is reported to cost about $3,000,000. Battey & Childs, 231 South LaSalle St., Chicago, are engineers.

Rockford, Ill.—Elco Tool & Screw Corp., 1800 Broadway, machine screws, wood screws, cap screws, bolts, nuts, etc., plans new plant on local site, comprising several one-story structures, totaling about 200,000 sq ft floor space. Large increased capacity will be carried out. Cost reported over $1,800,000. Marshall P. Munz, Empire Bldg., Rockford, is architect.

Kanopolis, Kan.—Great Bend Brick & Tile Co., Inc., North Main St., Great Bend, Kan., brick, hollow tile and other structural clay products, has plans under way for new plant on tract of about 140 acres of land at Kanopolis, recently acquired. Project will comprise several one-story buildings, equipped for a rated output of 40,000 bricks per day. Cost about $400,000. Proposed to begin work sometime this fall.

Bowling Green, Ky.—Detrex Corp., 14331 Woodrow Wilson Ave., Detroit, Mich., degreasers, degreasing solvents, cleaning compounds, etc., is considering construction of new plant at Bowling Green, where site is being secured. It will consist of a main one-story structure and several smaller units. Cost reported close to $1,000,000, with equipment.

Package model for low budget plant, development of Scientific Design Co.

Louisville, Ky.—Brown-Forman Distillers Corp., 1908 Howard St., plans expansion and improvements in local Early Times whiskey distillery, including new buildings and modernizing of certain existing structures. Entire project will represent a reported investment of about $1,500,000. Proposed to begin work soon.

Baltimore, Md.—Armco Steel Corp., 3400 East Chase St., has authorized expansion in local mill, given over largely to production of stainless steel. Work will include a new rolling mill, to be installed in one-story structure, 60,000 sq ft floor space, to be erected. Entire project will represent an investment of $5,500,000, and is scheduled for completion early in 1956. Main offices are at Middletown, Ohio.

Cumberland, Md.—Pittsburgh Plate Glass Co., 632 Fort Duquesne Blvd., Pittsburgh, Pa., plans new plate glass plant at Cumberland, where tract of over 600 acres of land has been purchased. It will consist of several large buildings for different branches of production, and is estimated to cost approximately $34,000,000. Work is expected to begin soon and will require a period of months for completion. Lockwood, Greene Engineers, Inc., 30 Rockefeller Plaza, New York, N.Y., is architect and engineer.

Lawrence, Mass.—Essem Packing Co., 101 Beacon St., meat processor and packer, has completed plans for one-story addition for expansion in processing and general packing departments. Cost about $100,000. Work will proceed at once.

North Andover, Mass.—Western Electric Co., 195 Broadway, New York, N.Y., telephone equipment, wire and cables, radio apparatus, etc., has plans maturing for new plant on tract of 150 acres of land on Highway Route 125, North Andover. Project will comprise a number of one and multi-story buildings, totaling in all about 900,000 sq ft floor space. Machinery and facilities will be provided for a working force of about 2500 persons. Entire program will represent a reported investment of about $10,000,000. Charles T. Main, Inc., 80 Federal St., Boston, Mass., is engineer.

West Lynn, Mass.—General Electric Co., West Lynn Works, 40 Federal St., has authorized a long-range expansion and modernization program at local plant, with work to include certain building extensions and installation of equipment. Project, it is said, will require about 24 months for completion and will represent an investment of about $4,000,000.

Grand Rapids, Mich.—Fisher Body Division, General Motors Corp., 300 36th St., S.W., has approved plans for expansion in local plant, consisting of several new one-story buildings, about 250,000 sq ft floor space, to be equipped for expansion in press shop and other divisions. Cost about $1,500,000. Work will proceed at once. Argonaut Realty Division, General Motors Corp., General Motors Research Bldg., Detroit, Mich., is engineer.

Minneapolis, Minn.—International Paper Co., Paper Container Division, 220 East 42nd St., New York, N.Y., paper and paperboard containers, has plans maturing for new branch plant on State Highway 55, near Minneapolis, where large tract of land has been acquired. It will comprise a main one-story building and several smaller structures, with converting and other

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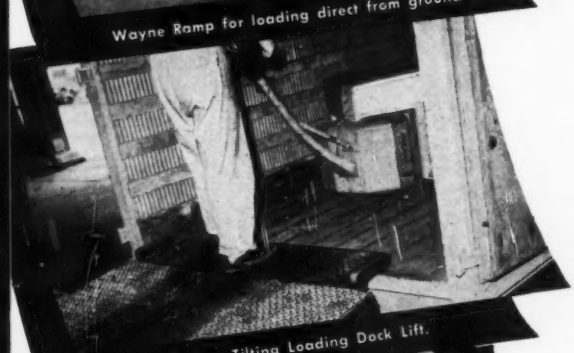
LOADING

HALF THE TIME... DOUBLE THE EFFICIENCY

Wayne Ramp for loading direct from ground level.



Wayne Tilting Loading Dock Lift.

Multiple installation of Wayne Dock Lift.

WAYNE LOADING DOCK RAMPS

. . . tilt to meet the load. Hand or industrial lift trucks roll smoothly into truck or trailer from shipping bay.

Just touch the control and the quick-action hydraulic system raises the heavy-duty all-steel ramp to proper height. Leveling fingers anchor it and the throw-over bridge spans the gap between truck and ramp. Cuts hours from shipping time . . . speeds warehousing time and cost . . . leaves more road-time for trucks . . . gets more work done with less effort.

Wayne Ramps are engineered for *you:* lifting and lowering heights, platform sizes, power units and controls fit your requirements *exactly.* This is all part of Wayne's "Liftronics" — the scientific approach to lift problems that designs Lifts for your job, builds them to fit your plant layout.

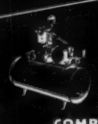
Write today for "LIFTRONICS" — data book on complete Wayne line of Industrial Lifts (Loading Dock Ramps and Truck Lifts, Platform Lifts, Cross-over Bridges, Industrial Truck Service Lifts).

THE WAYNE PUMP COMPANY

SALISBURY, MARYLAND — TORONTO, CANADA

Wayne

NATION WIDE SERVICE



COMPRESSORS

HOSE REELS

LUBRICANT DISPENSERS

INDUSTRIAL PUMPS

NEW PLANT CONSTRUCTION

equipment for manufacture of paper milk containers on basis of about 40 million units per month. Cost about $1,000,000. Work will begin this fall.

St. Louis, Mo.—Rawlings Mfg. Co., 2307 Lucas Ave., baseballs and soft balls, has plans for four-story addition to plant, about 165 by 240 ft, to be equipped for increased capacity. Cost reported about $1,00,000. P. John Hoerner, 4227 Watson Rd., St. Louis, is architect.

Omaha, Neb.—Allied Chemical & Dye Corp., Nitrogen Division, 61 Broadway, New York, N.Y., ammonia, nitrogen fertilizer solutions and other chemicals, plans expansion in recently completed ammonia plant at Omaha, comprising several new multi-story structures and installation of processing and other equipment to increase output from 60,000 to 120,000 tons per annum. Will represent an investment of several million dollars.

Kearny, N. J.—Monsanto Chemical Co., 1700 South Second St., St. Louis, Mo., pharmaceutical chemicals and compounds, industrial chemicals, etc., has acquired tract of about 25 acres of land at Kearny, and will use as site for new branch plant, primarily for production of phosphoric acid and phosphate salts. It will comprise two main processing and production units. Entire project reported to cost over $1,000,000. Work will begin this fall.

Deer Park, L.I., N.Y.—Fairchild Engine & Airplane Corp., Hagerstown, Md., airplanes, airplane engines and parts, plans new plant on tract of about 200 acres of land at Deer Park, recently acquired. Project will include a series of one-story buildings, providing large floor area, for parts production and assembling. Cost reported close to $3,000,000. New works will replace present plant of company at Farmingdale, L.I., which has been sold to Republic Aviation Corp., Farmingdale.

Geneva, N.Y.—International Paper Co., Container Division, 220 East 42nd St., New York, N.Y., corrugated and other paperboard containers, plans new branch plant at Geneva, where tract of about 16 acres of land has been secured. It will be one-story, equipped for large converting capacity. Cost reported in excess of $400,000.

Maumee, Ohio—Toledo Desk & Fixture Corp., Maumee, near Toledo, steel kitchen cabinets, undersink cabinets and kindred products, has completed plans for new one-story addition for large increase in present output. It will be equipped to give employment to about 400 persons, with production given over to steel kitchen cabinets. Cost about $2,000,000. Superstructure will proceed at early date. Company is a subsidiary of Crane Co., 836 S. Michigan Ave., Chicago, Ill.

Warren, Ohio—Packard Electric Division, General Motors Corp., wire and cable for aircraft and other service, magnet wire, etc., has completed plans for new addition to plant, to be equipped as a copper rod and wire mill. It will be one-story, about 225,000 sq ft floor space. Cost reported close to $2,000,000. Work on superstructure will proceed soon. Argonaut Realty Division, General Motors Corp., General Motors Research Bldg., Detroit, Mich., is engineer.

Tulsa, Okla.—Nelson Electric Mfg. Co., 217 North Detroit St., switchgear, switches, industrial controls and allied equipment, has plans nearing completion for new one-story factory on local site at 41st St. and Sheridan Road. Cost reported over $100,000.

Uniform, natural lighting is provided in interior space by Wascolite Skydomes

Anderson, S.C.—Owens-Corning Fiberglas Corp., has approved plans for new addition to local plant for manufacture of fiber glass for textile service. It will comprise several one-story structures, reported to cost over $1,000,000, with equipment. Work will begin soon. Main offices of company are in the Nicholas Bldg., Toledo, Ohio.

Knoxville, Tenn.—Tom Black, Inc., 1507 Mitchell St., N.E., potato chips and kindred food products, plans new plant on local site on Kingston Pike, near Bearden St., to be one-story, about 30,000 sq ft floor space. Processing and other equipment will be installed for considerable increase in present output. Cost reported about $135,000. Work will begin soon.

Roanoke, Va.—Miller Mfg. Co., Inc., 7th and Stockton Sts., Richmond, Va., building materials, has authorized plans for new plant in Roanoke for manufacture of corrugated paperboard containers. Tract of six acres of land has been acquired. It will consist of a main converting building and several smaller units. Cost reported over $250,000. A subsidiary interest is being organized under name of Miller Container Corp., to operate plant. Eubank & Caldwell, Roanoke, are architects.

Everett, Wash.—Everett Pulp & Paper Co., book and offset papers, writing papers, etc., will carry out an expansion and modernization program at mill. Three new one- and multi-story buildings will be erected, to be equipped for increased capacity in different divisions. Entire project reported to cost over $1,000,000.

Ravenswood, W.Va.—Kaiser Aluminum & Chemical Corp., 1924 Broadway, Oakland, Calif. industrial and special chemicals, aluminum products, etc., has plans in progress for new plant at Ravenswood, for production of aluminum sheet and plate products, aluminum welded tubing and kindred specialties. It will comprise a large group of one- and multi-story buildings, equipped to give employment to a working force of about 2500 persons. Project has been approved by Office of Defense Mobilization, Washington, D.C., and is estimated to cost about $68,000,000.

Eau Claire, Wis.—National Presto Industries, Chippewa Rd., pressure cookers, aluminum household wares, etc., has approved plans for two new one-story additions, 160 by 200 ft and 140 by 160 ft, respectively. Equipment will be installed for increased capacity. Cost reported close to $450,000. Work on superstructure will be carried out soon.

Kenosha, Wis.—Natural Marble & Onyx Co., 2543 North Pulaski St., Chicago, Ill., has approved construction of new one-story stone-cutting, polishing and finishing plant at Kenosha, 125 by 160 ft, reported to cost about $100,000. Work is proceeding.

Lake Mills, Wis.—Lake Mills Shoe Co. is considering new addition to factory, one-story, totaling about 30,000 sq ft floor space, reported to cost over $150,000, with equipment.

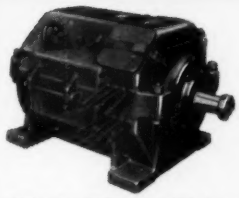
Oshkosh, Wis.—Sexton Can Co., Everett Mass., decorated metal containers and cans, plans new one-story plant on Marion St., Oshkosh, about 13,000 sq ft floor space. Cost reported close to $100,000, with equipment.

Port Edwards, Wis.—Nekoosa-Edwards Paper Co., fine writing and commercial papers, has plans under way for new addition to mill to be equipped as a pulp recovery unit. Structure will be about 100 ft high and equipped to handle 250-ton batches. Cost estimated about $1,500,000.

Racine, Wis.—Shephard Plating Co., 330 Wisconsin Ave., metal plating and polishing, has plans for new one-story addition, about 100 by 240 ft, estimated to cost over $125,000, with equipment. Work will get under way soon.

Waukesha, Wis.—Golden Guernsey Dairy Cooperative, care of Robert E. Rasche, 783 North Jefferson St., Milwaukee, Wis., architect, has plans under way for new dairy products plant at Waukesha. It will comprise several one-story structures, with main unit 120 by 300 ft. Processing and other equipment will be provided for large output. Entire project will cost close to $500,000. Architect noted above is in charge.

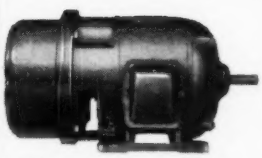
Gearmotor. Available in single, double, or triple reduction with any Crocker-Wheeler Motor in frame sizes from 1 to 150 hp.



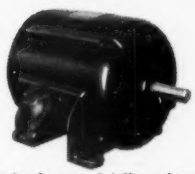
Mill motor, W600 series DC, conforms in all respects to AISE standards. Offers more power without an increase in frame size.

Explosion-proof "Sealedpower." Listed by Underwriters Laboratories for Class I Group D, and Class II Group F and G locations. Available in ratings up to 100 hp.

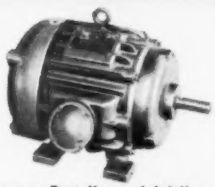
Wound-rotor protected type. For slow, smooth acceleration, high starting torque with low starting current or variable speed. Dripproof, splash-proof, 140-200 hp.



Brake motor using latest disc type brake mounted on dripproof motor. Also available with totally-enclosed and splash-proof enclosures for a-c or d-c.

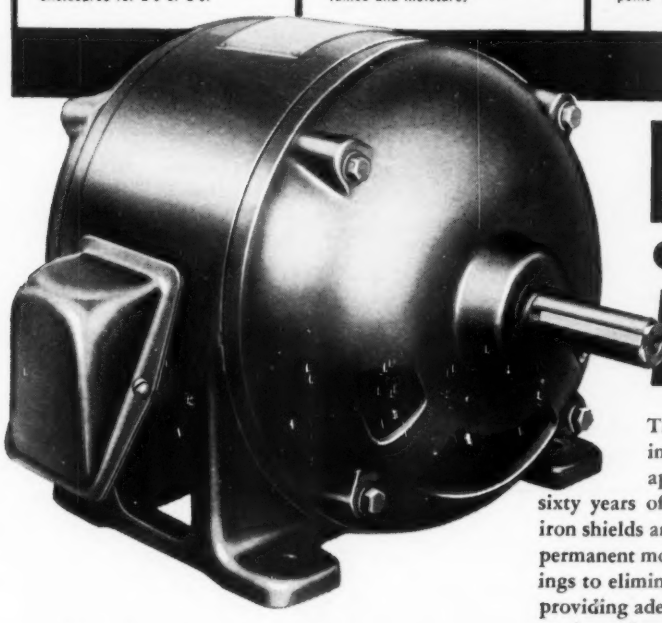


Squirrel-cage, totally-enclosed, non-ventilated. Available up to and including 3 hp, at 1800 rpm, for protection against dust, fumes and moisture.



The new Taconite-proof totally-enclosed fan-cooled squirrel-cage "Sealedpower." Armed against magnetic dust at every point of possible penetration.

Direct-current open-type (illustrated). Also dripproof guarded. Form F, in ratings to 7½ hp. Form H, in 10 to 200 hp.



Squirrel-cage protected type. An open dripproof motor for general purpose use. Available in wide modifications to meet a variety of conditions.

ELLIOTT
CROCKER-WHEELER
MOTORS

There's a rugged, dependable Elliott C-W Motor in this line-up for practically every 1 to 200 hp application in industry. They are backed by over sixty years of proven design and construction. Grey cast-iron shields and frame assure solid support for bearings and permanent motor alignment. Sealed, prelubricated ball bearings to eliminate bearing contamination or corrosion while providing adequate grease for the life of the bearings. These are just a few of the many features that add up to long years of trouble-free service. For details on any of these motors, call your local Elliott Field Engineer or write for the latest bulletin. Address Elliott Company, Crocker-Wheeler Division, Ampere, N. J.

ELLIOTT Company

W4-4

TURBINE-GENERATORS TURBINES MOTORS GENERATORS DEAERATING HEATERS EJECTORS CONDENSERS COMPRESSORS TURBOCHARGERS TUBE CLEANERS STRAINERS

For more facts circle 566 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

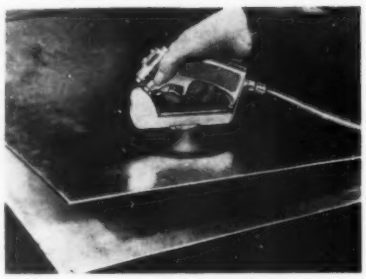
1—SEPARATOR-SNUBBER performs two jobs at once

Announced as the first device of its kind to perform the twin functions of water separation and noise reduction, the WSS Water Separator Snubber is claimed to extract 100 per cent of water from water-sealed vacuum pump exhausts and —at the same time— reduce noise from the gas discharge to ear comfort level. Both water and air enter the side of the unit and are separated centrifugally within it. The water-free air is then discharged at the top and the water leaves at the bottom of the unit.

It handles water having percentage of settlings and other impurities, says manufacturer, and can be cleaned conveniently when necessary. For critical installations where optimum silencing is required, a standard snubber may be installed in the line leading from the water separator snubber. Sizes range from 6- to 26-in. diam. Burgess-Manning Co.

2—FORK LIFTS, gas powered, go easy on the fuel

Two new gas powered fork lift industrial trucks, FD 50 and FD 60, are announced as speeding handling operations in manufacturing plants, warehouses, and rugged outdoor terrain. According to company, the FD50, rated for loads to 5000 lb, and the FD 60, for loads to 6000 lb, can do a day's work on less than 5 gal of gas, thanks to the electric transmission utilized. Design features incorporated in both trucks include: worm-gear driven axle for efficiency under heavy loads when maximum power is needed, reducing speed in one step; inching control permitting high speed hoisting at low travel speeds; and transmission with variable voltage — the d-c generator being integral with the engine. Baker-Raulang Co.



4—SHEET LIFTER utilizes vacuum from compressed air

As long as the trigger in the pistol grip type handle of the Pres-Vac Lifter is held down, the suction cup will pull 11 lb, says manufacturer. This constant lifting power is produced by passing compressed air through the venturi at 45 psi to create a constant vacuum of 22 in. of mercury. The vacuum is conveyed to the rubber cup through passages in the handle, and a regulator reduces line pressure to 45 psi.

Suggested applications for the Pres-Vac Lifter include the lifting of sheet steel, glass, plywood, Masonite, plaster board, complete cabinets, and other objects with a flat surface on which a vacuum can be maintained. The lifter has a 5-in. Neoprene cup, aluminum handle, 96-in. hose, and pressure regulator. It is ready for use when connected to an air line. F. J. Littell Machine Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 205-206.

5—REPLACEMENT BATTERY for walkie-type lift trucks

This battery unit (the Charger 6 SPC-11, 275 amp-hr) has a permanently mounted charger. The battery remains on the truck and can be given a boost when truck is not in operation. It can be charged by plugging into a 110-v 60-cycle outlet. According to manufacturer, the charger can be left on without damage to battery, and routine charging can be done overnight. You don't have to disconnect the battery from the truck, since the charger is permanently connected to the terminals. As a further convenience, the top tilts back with the charger for easy access to the battery for adding water. K-W Battery Co.

6—EXTRUDED SHEETS of acrylic plastic, many sizes

Now in commercial production are extruded sheets of Plexiglas. They are announced as lower-priced than cast sheets and suitable for outdoor, as well as indoor applications. Plexiglas extruded sheets are available in thicknesses of 0.060 in., 0.080 in., 0.100 in., and 0.125 in., in widths of 36 in. and 48 in.; in lengths from 48 in. to 96 in.; and in both clear transparent and white translucent form. The new extruded sheets are suggested for applications requiring a thin-gage, lower-price material with properties of cast acrylic plastic. Rohm & Haas Co.

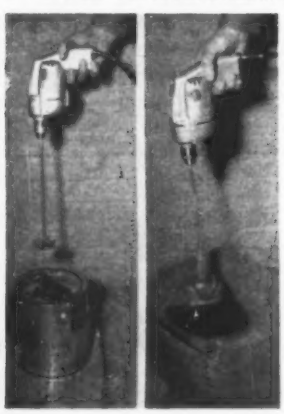
7—ROOF MAINTENANCE NEEDS in packaged units

Announced as a new idea in supplying maintenance materials, these package units contain materials and tools needed for roof maintenance. The G-C package is designed for roof resurfacing and the

G-P package for repairing flashings, gutters, cracked or blistered felts and many other roof weak spots. Besides simplifying purchasing, these units are intended to eliminate guesswork in computing quantities needed. Being job-sized units, they serve to reduce materials waste. And it is reported that the one-step technique of applying the Glasfab contained in these packages cuts installation cost and permits savings on roof maintenance.

Both packages contain Glasfab Roof-

3—DRILL ATTACHMENTS mix the paint, clean the brush



These attachments for use with a ¼-in. electric drill—paint mixer and brush cleaner—let the drill handle two messy jobs connected with painting projects. The mixer has a 10-in. steel shaft and mixing head with curved blades. It stirs a gallon of paint quickly when rotated by the drill, says manufacturer, scraping the bottom and sides for thorough mixing. It can be used with oil or water mixed paints, or powder-mixed solutions.

The brush cleaner is designed to get the paint off any brush up to 6-in. wide and 1¼-in. thick. It has a 12-in. steel shaft and double U-shaped brush holder with thumb screws. After the drill, holder and brush assembly is complete, the brush is first flushed in a cleaner. Then the unit is transferred to any old box or container and the drill turned on briefly to spray out the brush contents. Mixer and brush cleaner cost around $2.50, or each may be had separately. Century Sales.

There goes the profit on how much production!

Here's a familiar sight—a mechanic repairing a valve—a routine maintenance job. Maybe the cost is only forty or fifty dollars. But even that represents the profit on how much of your production?

Spread out through the year, made up of many jobs, the big impact of excessive piping maintenance is sometimes missed. It's there nevertheless, and, of course, you pay for it. You can't avoid maintenance, but you can control it.

Thrifty buyers don't wait for complaints of high piping costs. They protect against them with Crane quality—the traditional quality standard in valves and fittings, and the best assurance of low-cost, dependable service.

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For more facts circle 567 on Reply Card

NEW PRODUCTS

(Begins on page 132)

ing Membrane—an open-mesh fabric woven of inorganic fiber glass which, manufacturers say, does not char, rot, burn, become brittle or decay. Applied with the roof coating (contained in the G-C package) or the plastic cement (contained in the G-P package), a single ply installation of Glasfab is said to give 10 yr of water-tight protection. A bulletin shows procedure. Lexsuco, Inc.

8—MOISTURE TRAP is low cost, simplified unit

Offered to meet the need for a simplified float trap on air, gas and steam applications, the No. 81 Moisture Trap is compact but has good capacities for its size. It is designed as a low cost method of draining moisture and condensate continuously and automatically from piping systems and equipment which handles air, gas or steam. The trap is suitable for operating pressures to 200 psig and has an optional inlet.

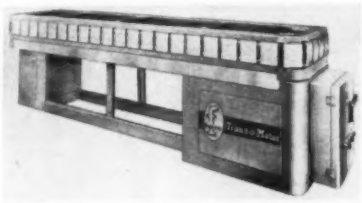
The trap consists of a stainless steel valve and seat, and lever, plus a copper hide float inside a cast semi-steel case. (A stainless steel float can be furnished when specified.) The valve is opened by liquid raising the float and closed when the float drops the liquid level. Either ½- or ¾-in. connections can be had. With copper float, the trap costs around $17.00. The V. D. Anderson Co.

9—DOCK BOARD features an improved safety curb

According to manufacturer, the new Magliner has a safety curb that power truck wheels can't damage. The curb on this magnesium dock board is so designed that the wheel rims are prevented from striking against it. It is pointed out that with this type of curb damage prevented, the service life of the dock board is greatly extended. The board also has a special alloy curb end of cast magnesium, engineered to provide greatly increased strength at this critical point of stress. Curb ends are of wide-radius design to facilitate turning on and off the board in narrow quarters. Designed for one-man handling, the Magliner is custom-engineered to meet specific plant conditions for handling loads up to 20,000 lb. Magline, Inc.

10—TRANSFER MACHINE is multiple station type

Suitable for a wide variety of applications in industries now converting to automation, the multiple-station Trans-o-Mator is announced as affording savings in design time, and manpower requirements, as well as higher production rates, improved product quality and



ease of maintenance. Users of the Trans-o-Mator merely attach tooling as required to perform various light machining, forming, pressing, assembling and inspection.

The Trans-o-Mator contains a complete power transmission unit, including motor, reducer, clutch, roller gear drive for high speed indexing, chain and carriers. There is an electrical interlock system between indexing and tooling power supply as well as start, stop and jog controls and provision for an automatic scanning device.

Basically there are two standard Trans-o-Mators. Type A, available with modifications, is primarily for industries where versatility of operation is important and retooling may be required. Production rates as high as 6000 pieces per hour may be attained with it. The Type B, designed to operate at speeds up to 20,000 pieces per hour, is made with several variations in timing. This high speed unit is primarily for use where high production rate and low production costs are critical. Roller Gear Div., Ferguson Machine & Tool Co.

11—STATIONARY BATTERIES for control switchgear

These batteries are specifically designed for switchgear, control, and auxiliary power applications, says manufacturer and are not of a compromised construction to cover all types of stationary service. They are made in two lines, PlastiCell and PlastiCal, in capacities from 10 to 770 amp-hr. The former is intended for full-float operation where a life-expectancy of 14 yr in float service normally applies. Proportionately long life is also anticipated when used in trickle charge service.

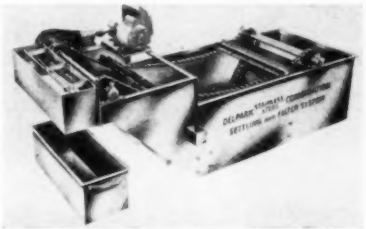
The PlastiCal features lead calcium grids (in sizes from 40 to 770 amp-hr) and is said to offer a conservative life expectancy of 25 yr in full-float service. It is pointed out that this battery further reduces maintenance required because water additions are requried less often.

Both lines of the batteries have extra thick positive plates with triple insulation suspended from ledges molded into the jar, to allow normal plate growth without strain on the cover. Negative plates are supported on heavy ribs molded into the jar bottom. They are supplied in a clear plastic, one-piece jar and case which, because of its lighter weight, affords lower shipping costs. C&D Batteries, Inc.

12—FILTER SYSTEM available in stainless steel

Liquids which would be affected by other types of metals may be safely filtered through the Delpark Settling and Filter System, manufacturer states. Of stainless steel, it is suggested for use in the paper making industry and in the food processing industry for filtration of edible oils and juices. Designed for filtering particles 0.004 in. or larger, the filter makes use of a settling basin for the removal of particles varying in weight prior to filtration through screens.

Chain driven flights of solid and brush construction pass down the filter screen



removing filtered solids, then across the floor of the settling area gathering additional sediment. These solids are carried by the flights up a ramp at the end opposite the filters — here the flights are automatically cleaned, the solids falling into a tote box. The flights then return to the screens and the cycle is repeated. Screens are of bar stock construction and may be removed for cleaning by sliding a metal plate into position back of the screen to prevent unfiltered particles from passing back into the system. Industrial Filtration Co.

13—STEAM CLEANER gets rid of the toughtest dirt

Developed for rugged cleaning jobs, such as encountered in chemical processing plants and areas contaminated by floods, the Vapor-Clarkson Hydro Steam Cleaner Model 4989-G is designed to jet out 1200 gal of hot water an hour at 240 lb pressure. This portable cleaner

— shown in use on a railroad box car — incorporates an automatic 40 hp steam generator designed to develop 120 lb working steam pressure in 2 min from cold water, and over 1100 lb of steam per hour which is directed through a Sellers Injector. The new unit is equipped for cleaning in three ways: by jetting out 180 F water under 240 lb

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This rugged, economical, steel product, with skid-resisting safety tread rolled right into it, is a practical material not only for those places where feet and wheels must travel but also for many other applications where slip-resistance, durability, fabrication costs and appearance are factors.

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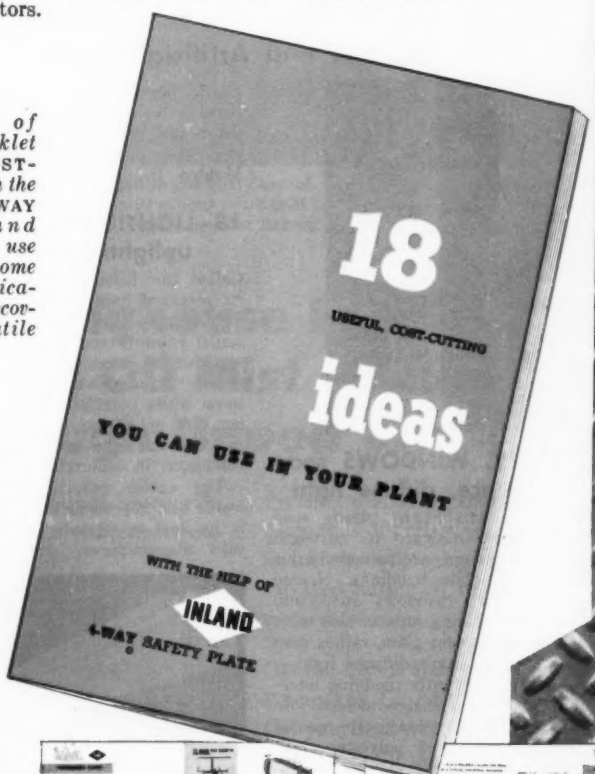
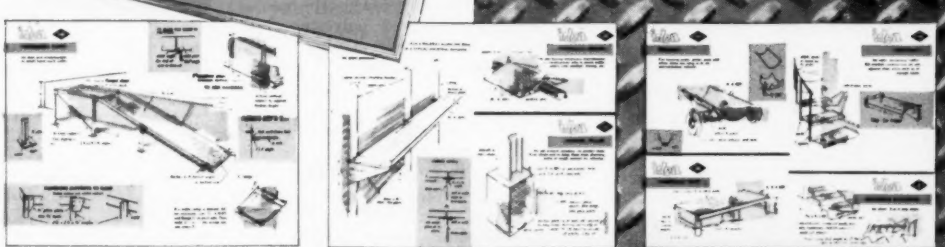


Ideas like:

- ____How to fabricate utility dockboards
- ____How to build an all-welded stairway
- ____How to construct a personnel rampway



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For more facts circle 568 on Reply Card

NEW PRODUCTS

(Begins on page 132)

pressure; by jetting hot water under pressure mixed with a cleaning detergent; and by steam cleaning, with or without detergents — methods which meet almost any dirt condition.

The unit is mounted on a two wheel trailer and enclosed in a metal cabinet. Fuel tanks for 8 hr of operation and a float control water supply tank are in the cabinet; steam hoses and a cleaning gun are included. Automatic controls let the machine make steam only when the gun is turned on, it is explained; however, the generator automatically cycles on and off to hold the working steam pressure. A 4.5 gasoline engine drives the pumps, blower, and magneto for constant ignition—or a 2 hp electric motor may be used. Steam pressures can be adjusted from 75 to 290 lb. When running steady, generator uses 9 gal of fuel oil per hour. Vapor Heating Corp.

15—TANK LIGHT for use with flammable chemicals

The Type EV 2375 is offered to assist the processing of flammable chemicals. When equipped with company's Type R 75-w 120-v spot lamp and suspended over a tank porthole, the new pendant-type fixture illuminates the surface of the mixture inside the tank. Machined from cast aluminum, the joints of the 12¼- by 6⅞-in. fixture are threaded and flame-tight, says manufacturer, the top joint being gasketed as additional protection against the entry of dirt or liquids. The heavy glass lens is heat and impact resistant, and the lamp receptacle, a separate unit, is designed to absorb shocks. By using a suitable flexible fixture support, the lamp may be swung out from the tank porthole for relamping.

Company states that for chemical processing applications, the new fixtures qualifies for use at Class I, Groups C and D hazardous locations; when installed in horizontal or vertical base up position, is suitable for Class II, Groups E, F, and G locations. Crouse-Hinds Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 205-206. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

17—FORK LIFTS, compact gasoline powered units

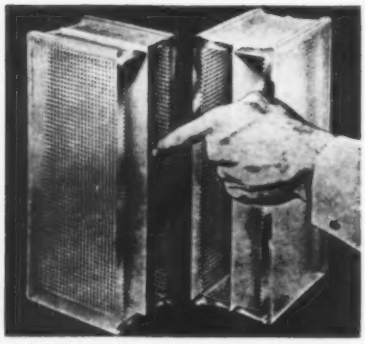
The G-52 Series of gasoline powered fork lift trucks offer a high power-weight ratio. They are available with pneumatic or solid tires in 2000, 3000 and 4000-lb capacity models. They were developed to meet a demand for smaller, more powerful and more maneuverable fork lifts. Typical of the series is a 2000-lb capacity model which can negotiate a right angle corner in a 57-in. aisle, or right angle stack in a 112-in. aisle. The Yale & Towne Mfg. Co.

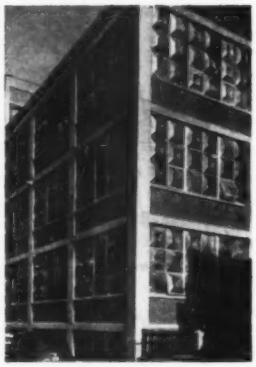
New Approaches to Visual Comfort with Natural and Artificial Lighting

14—GLASS BLOCKS reduce glare, solar heat gain

Suntrol Blocks are introduced as a solution to high brightness problems resulting from sun and snow. They contain a pale green fibrous glass diffusing screen said to reduce surface brightness or glare by 35 per cent, and instantaneous heat gain by 25 per cent. The choice of green as the screen color was based on psychological research on human reaction to colors, says company — light coming through the blocks on sunny exposures makes rooms seem cooler.

Suntrol Blocks come in three 12-in functional patterns including a toplighting block for skylights. They are available in a light-directing pattern that throws light upward toward the ceiling; a light-diffusing pattern that diffuses light in all directions; and in toplighting blocks that distribute light over wide floor areas. The exterior face of a Suntrol has almost twice the impact resistance of standard blocks, it is stated; but in thickness, insulation value and weather resistance they are same as company's other 12-in. double cavity blocks, and cost no more. Pittsburgh Corning Corp.





16—PLASTIC WINDOWS snap into place, diffuse light

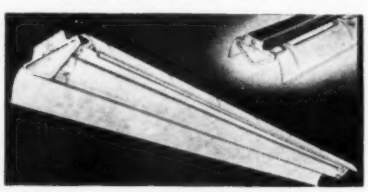
Shatterproof translucent plastic windows, that curve outward for strength and to catch sunlight, are announced for industrial and public buildings. Named Vizalite, the new windows snap into place and need glazing on one side only. Intended to supplement glass, rather than replace it, they transmit diffused light — broken up into constantly changing interesting patterns by a design molded into the window. The windows are molded from fibrous glass and polyester resin and claimed to be strong enough to support the weight of a man.

There are two styles of windows — a square one in sizes up to 3-ft square, and a casement type in sizes to fit standard casement frames. Skylights are also available. In the square window, pictured, the diamond-shaped design places the plastic under tension to make it rigid — no metal cross frames are needed. The plastic is only $\frac{1}{16}$-in. thick and weighs only 7½ oz per square foot. Storms are said to have little effect on these windows. Since they curve outward, pressure against them tightens them in their frames. Also, the planes in the design promote the flow of rain water over the surface to flush away dirt. Molded Insulation Co.

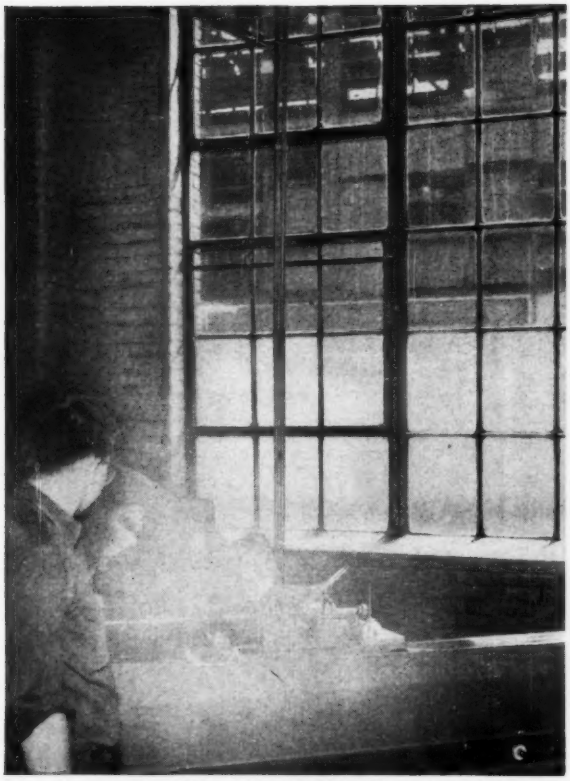
18—LIGHTING FIXTURE offers uplighting feature

Called the Lifetime CFI-25 because of its potential long service, this industrial lighting fixture is said to afford greater visual comfort and reduced maintenance —within an economically justified price range. It is described as a handsome snow white porcelain fixture offering 25 per cent uplighting—a feature difficult to provide in lighting fixtures suited to conditions in industrial plant areas.

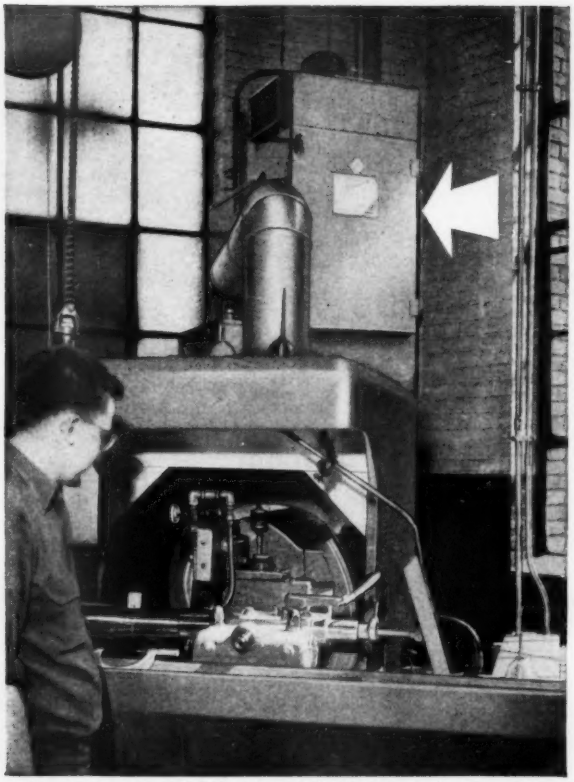
The entire reflection surface (both inside and top surfaces of the reflector) is finished in vitreous porcelain enamel, says manufacturer, and the reflection



factor is 85 per cent or more. Full 8-ft reflectors are furnished, so there are fewer pieces to handle during an installation and fewer joints in continuous runs of fixtures. Apertures are die-embossed and a new ribbed construction reinforces lateral strength to prevent the reflector from spreading and getting out of alignment. A longitudinal V-center louver provides 30 deg cross shielding and reinforces lengthwise rigidity. The CFI-25 is listed and recommended with hinged louver assembly, but is also available without it. Day Brite Lighting, Inc.



Before installation of Precipitron Oil Mist Control, this high-speed grinder developed as much as 10 gallons of oil mist in a single shift. Result: menace to workers' health . . . fire hazard . . . efficiency depressant.



After installation of Precipitron Oil Mist Control, oil mist from the same high-speed grinder is no longer a problem. Precipitron traps the extremely small particles of oil, dirt and smoke—*electronically*—leaves air clean, safe.

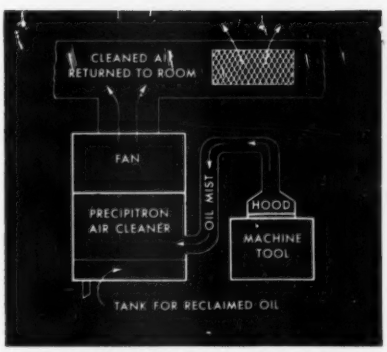
Westinghouse PRECIPITRON® Eliminates Coolant Oil Mist as Hazard . . . Pays For Self Through Upped Efficiency, Fuel Savings

Electronic air cleaner more efficient, economical than mechanical air filtration.

Westinghouse Precipitron Oil Mist Control is the positive way to free your plant of dangerous, costly oil mist. Precipitron improves visibility, boosts operating efficiency, eliminates hazardous working conditions, strengthens employee morale—*and pays for itself at the same time!*

Present installations show savings of thousands of dollars yearly, directly in fuel, housekeeping expenses and salvaged cutting oil, indirectly in increased efficiency.

Get full details about Westinghouse Precipitron Oil Mist Control now. Call your local Westinghouse-Sturtevant office, or write Westinghouse Electric Corporation, Sturtevant Div., Hyde Park, Boston 36, Mass.



Here's how Precipitron works: Collection hoods catch oil mist at source. Quiet, efficient Westinghouse fan units draw coolant-laden air through Precipitron air cleaners—oil, smoke, fumes are completely trapped. Operating cost: pennies per week.

WESTINGHOUSE AIR HANDLING

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For more facts circle 569 on Reply Card

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...PUTS OUT MORE FIRE FASTER with LESS LIQUID and PREVENTS FLASHBACK!

HERE'S PROOF!
ROARING TEST FIRE
OUT...in
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*Exclusive Chemical Liquid . . . available only in Fyr-Fyter Loaded Stream INSTANT Extinguishers.

This raging inferno, with flames shooting 20 feet in the air, is an Underwriters' test fire in a 100 square feet pine panel.

When fire is highest, INSTANT'S KARBALOY LOADED STREAM is aimed at fire. The roaring blaze was killed in record time . . . 11 short seconds!

This test fire is conclusive proof of Instant superiority! Karbaloy, the extinguishing liquid developed by engineers now prominent in atomic research, killed the fire in one-third time required by ordinary extinguishers . . . and only two quarts of liquid was used! Karbaloy also fireproofs as it extinguishes . . . preventing flashback or fires in rubber and other combustible materials that start up again *after* being put out by ordinary chemicals.

Fyr-Fyter Instants are designed to stop the *most prevalent fires* in wood, rubber, fabrics and other general combustibles. They require no recharging, except after use, and need no protection from freezing. The long-range Loaded Stream can be discharged at a *safe* distance of 45 to 60 feet to fight flames that cannot be approached at close range. No other extinguisher provides the combination of advantages found in Fyr-Fyter Instant Extinguishers!

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TEAR OUT THIS COUPON AND MAIL WITH YOUR LETTERHEAD

☐ Send full details on Fyr-Fyter Instant Extinguisher.

☐ Send a Fyr-Fyter Representative. Let's talk it over. No obligation.

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For more facts circle 570 on Reply Card

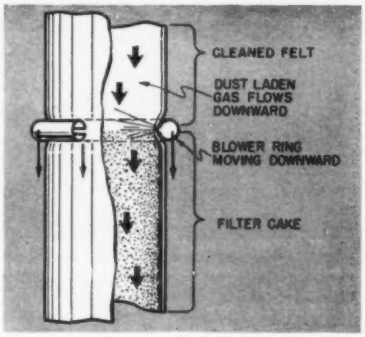
NEW PRODUCTS

(Begins on page 132)

19—DUST COLLECTOR with self-cleaning filters

Extra high efficiency — due to an automatic filter cleaning mechanism — is claimed for the Dualaire Reverse-Jet Dust Collector. It is pointed out that in this collector the filtering elements stay porous, don't have to be taken out of service for cleaning, and last longer because they aren't subjected to shaking or rapping to remove accumulated dust.

Filters in the Dualaire are wool felt cylinders, open at both ends, through which the dust laden gas flows. Removal of dust cake on the inner surface of the cylinder is by means of a blow ring moving up and down the outside of the cylinder. Removal is done before the cake increases sufficiently to affect filtering



capacity, and is automatically controlled by pressure drop. When the differential pressure across the felt increases to a predetermined point, the tubular blow ring starts moving. As shown, this ring is in two segements, with a slot along its inside periphery contacting the cylinder. Air passing through this slot is forced through the filter to remove the filter cake. The inside diameter of the ring is less than the outside diameter of the cylinder — so as it moves up and down it keeps the slot in contact with the filter to prevent the escape of air and provide a slight flexing action which loosens the filter cake.

The blow ring reciprocates over the filter element until the pressure drop is reduced to a set point. Then ring action and air flow stop until the filter cake builds up sufficiently to resume the cleaning action. Other design and construction details on the Dualaire Reverse-Jet Dust Collector and performance data are provided in an illustrated bulletin. Western Precipitation Corp.

20—BRAKEMOTOR for use where space is limited

The short over-all length of the integral brakemotor, made possible by using the motor end bracket as an integral part of the brake, permits its use where space is limited. These units utilize disc brakes, are available in NEMA motor frame sizes from 203 to 326. The brakes are

For more facts circle 571 on Reply Card →

8 reasons why you should

MODERNIZE EQUIPMENT WITH TRI 55 CLAD MOTORS

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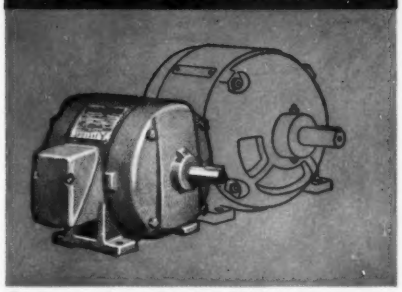
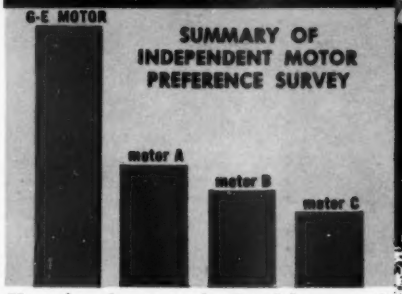
Plan now to modernize your equipment with the all-new General Electric Tri/Clad '55' motor, available now in many ratings; entire line of 1 to 30 hp a-c motors available soon. Contact your G-E Representative. General Electric Company, Section 648-6, Schenectady 5, N. Y.

MORE POWER PER POUND



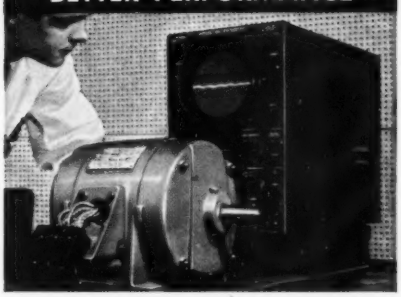
Lighter and smaller Tri/Clad '55' motors in new NEMA frame sizes and ratings save you space and weight, reduce handling costs.

BUYER PREFERENCE



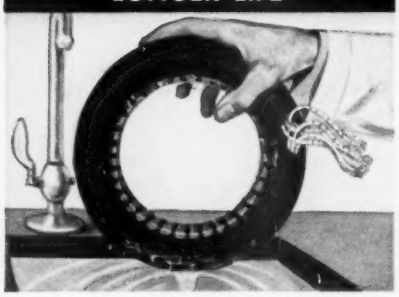
You take advantage of a 2 to 1 buyer preference for the electric motors on your equipment when you buy or specify a G-E motor.

BETTER PERFORMANCE



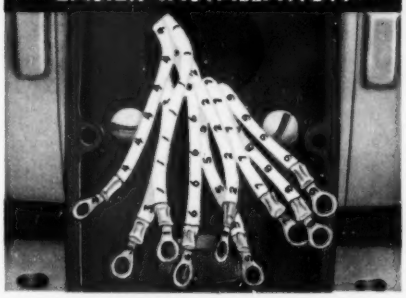
Quieter operation, proved by sound-room tests, is typical of the many performance improvements in the new G-E Tri/Clad '55'.

LONGER LIFE



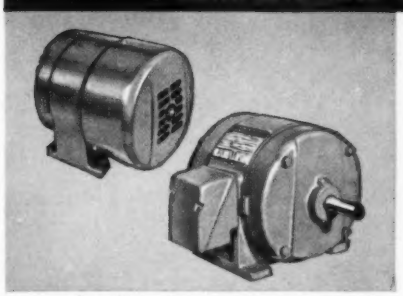
A silicone Dri-film* coating makes insulation shed water—lengthens motor life. Polyester-film insulation is 8 times stronger.

EASIER INSTALLATION

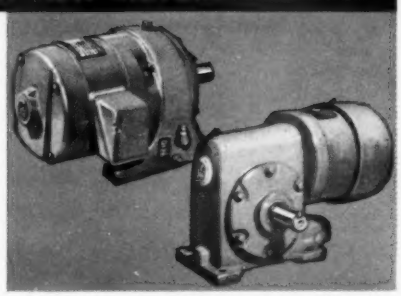


Perma-numbered leads are always instantly read even when wires are taped or clipped. Conduit box has plenty of knuckle room.

COMPLETE LINE OF NEW MOTORS



A complete line of new motors assures the right electrical drive for your machine. Write for Bulletin GEA-6013 on dripproof motors,



GEA-6012, on enclosed motors. For low speed jobs, G.E. offers a complete line of gear-motors. Write for Bulletin GEA-6027.

NEAR-BY SERVICE

CLASSIFIED
Electric Repair Service
—(Continued)
GENERAL ELECTRIC
SMALL MOTOR SERVICE STATION
Complete facilities for in and out-of-warranty repair or exchange of A-C and D-C motors and generators to 15 HP. Authorized distributor G-E motor renewal parts and G-E single-phase motors.
"WHERE TO CALL"
AUTHORIZED G-E MOTOR SERVICE
Street Address..... Phone No.

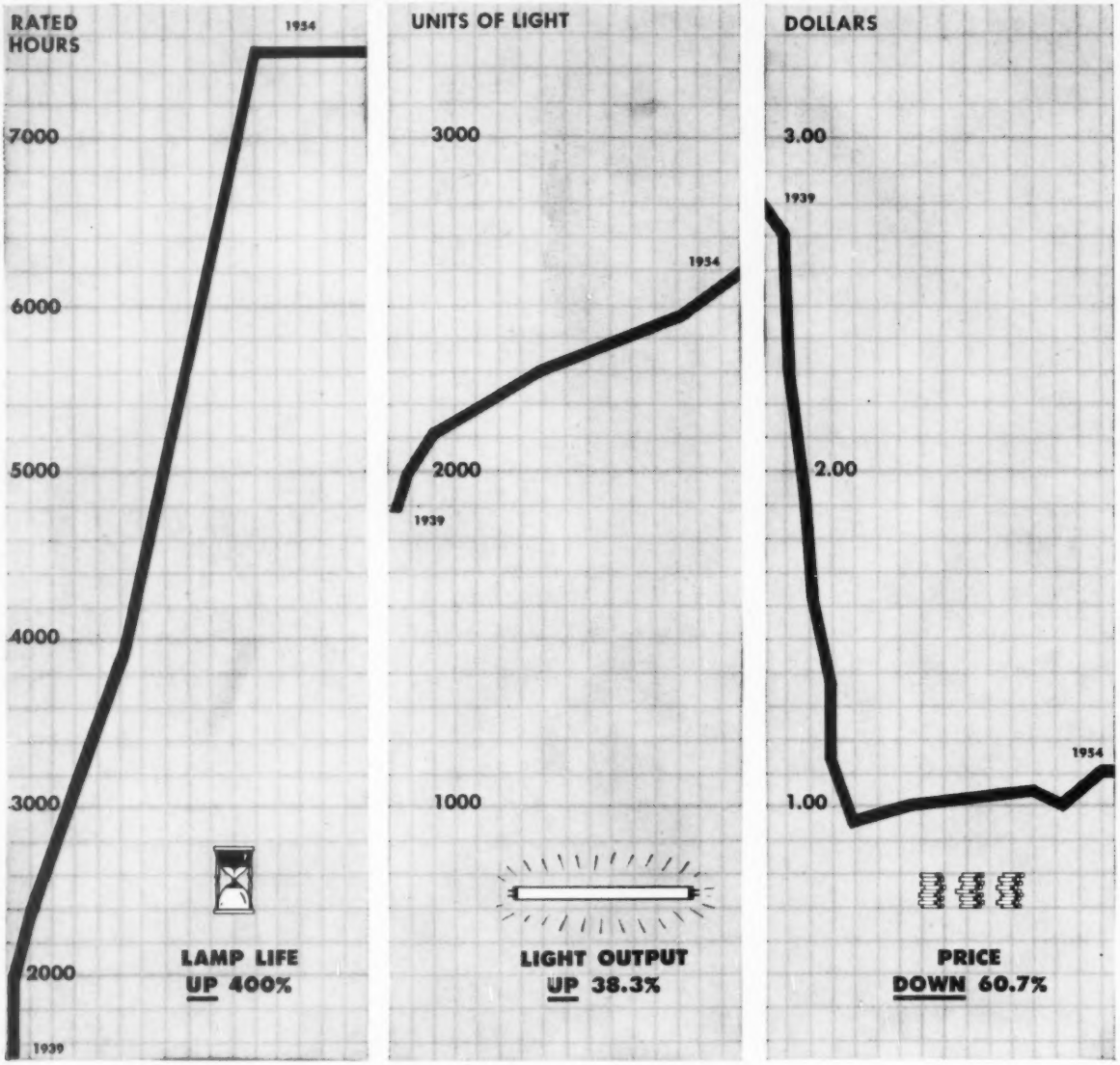
G-E service is as close as your telephone. Authorized motor service stations provide repair-facilities in all major trading areas.

*Reg. trade-mark of General Electric Co.

Progress is our most important product

GENERAL ELECTRIC

YOU EXPECT THE BEST VALUE FROM G-E FLUORESCENT LAMPS



16 times more value for your fluorescent lamp dollar than in 1939

Today you don't have to pay more than $1.10 for the finest fluorescent lamp made: General Electric. Fifteen years ago it would have cost you $2.80 or $1.70 more. And while price has been going down, we've been pushing quality up. General Electric has upped light output 38%, increased lamp life 400%.

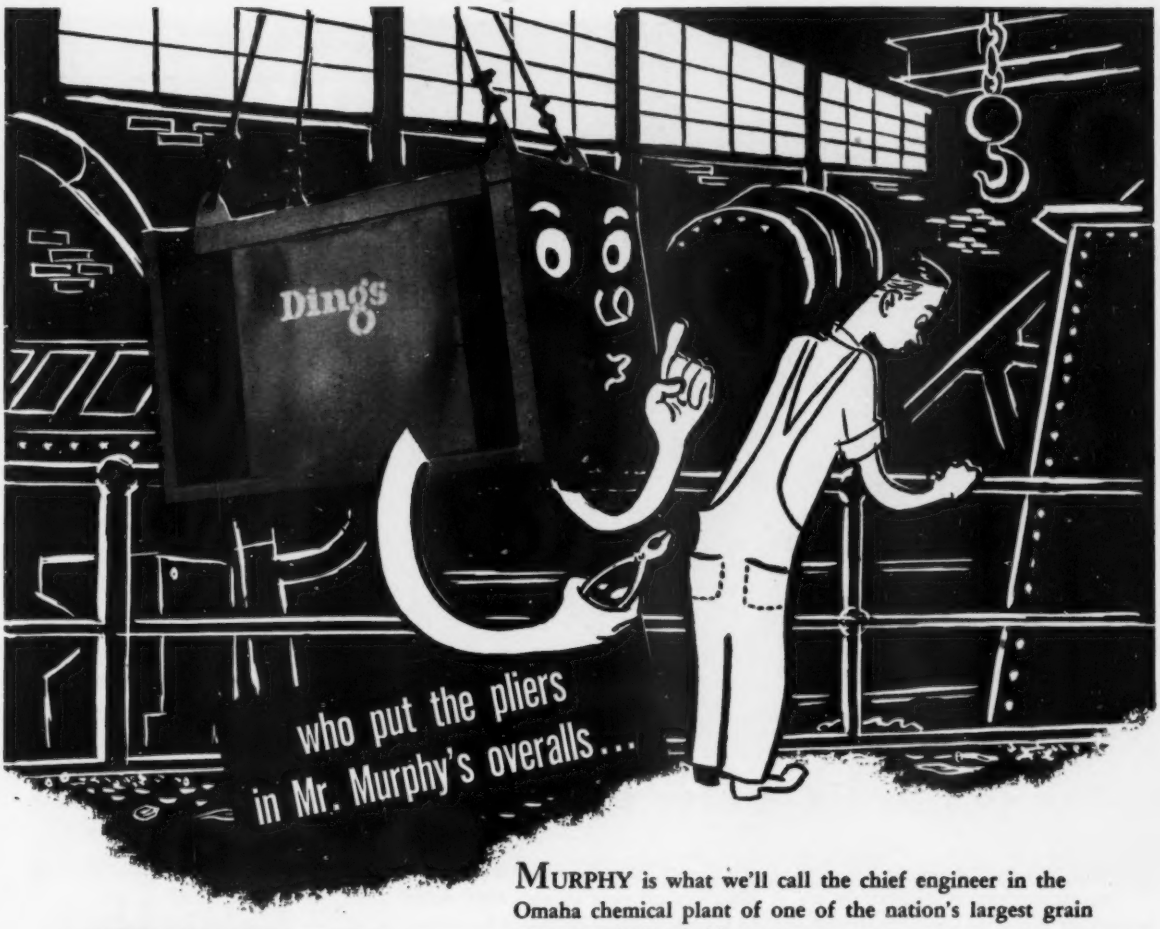
In terms of what you really judge lamps by, a General Electric 40-watt fluorescent lamp that lists at $1.10, plus tax, today is a *16-times bigger value than it was in 1939.*

For further information, contact your G-E lamp supplier or write to Lamp Division, General Electric, Department 166-PE-10, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 572 on Reply Card

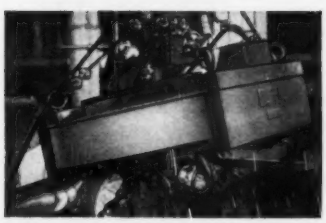


MURPHY is what we'll call the chief engineer in the Omaha chemical plant of one of the nation's largest grain processors.* Here's his story —

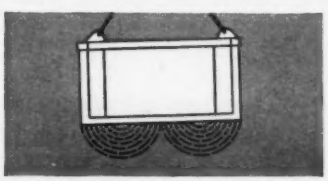
One day, not long after his Dings RM Suspended Tramp Iron Magnet was installed, he was wishing he had a pair of long nosed pliers. Shortly after, one of his men walked up and handed him a pair. They'd been pulled out of a 12-inch conveyor belt burden of corncobs by the Dings RM Magnet.

Murphy was awfully glad to see those pliers and not just because he wanted a pair. He was thinking of what they would have done to the hammermills and other processing equipment fed by that conveyor, if they hadn't been caught by the Dings Magnet.

You might think about that, too. What's it costing you to "process" tramp iron in your plant? It isn't necessary. Your Dings representative can show you an economical way to eliminate tramp iron with a Dings Magnetic Separator.



THIS IS THE MAGNET THAT CAUGHT THE PLIERS — That junk on the bottom is a typical tramp iron accumulation— crushed "tin" cans, wire. "Murphy" reports even crowbars occasionally find their way into the corncobs processed in his plant.



HERE'S HOW IT WORKS — The Dings RM Magnet can be suspended over conveyor belts, installed on chutes or liquid lines. There isn't a more powerful tramp iron magnet than this triple-poled unit. Its field is deeper and longer, and it's available in a complete range of sizes and magnetic strengths. Complete details in Catalog 1315-A.

*Name and complete details on request

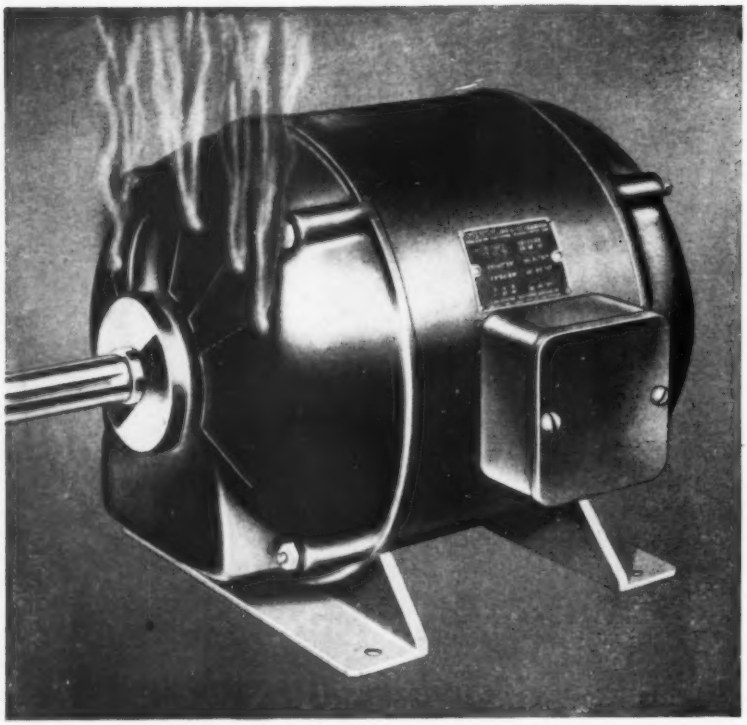
DINGS MAGNETIC SEPARATOR COMPANY

4766 W. Electric Ave., Milwaukee 46, Wis.

RM-154

Dings

For more facts circle 573 on Reply Card



You can avoid motor burnouts

THE temperature surrounding motor protection equipment is an important factor in motor burnouts. In order to prevent nuisance stoppages in hot weather, the rating of protective equipment is often raised. Then, when plant temperature drops, protection is inadequate . . . motors are more subject to burnout.

This explains why an ever-increasing number of plants are standardizing on HEINEMANN Circuit Breakers as manual motor controllers. Set tripping points of HEINEMANN Circuit Breakers *are completely independent of ambient temperature.*

Moreover, HEINEMANN Circuit Breakers provide inverse time delay to permit starting inrush or harmless, temporary overloads . . . yet they provide the fastest circuit interruption available on large overloads, stalled rotors, single-phasing or short circuits.

HEINEMANN Circuit Breakers operate on a hydraulic-magnetic principle. They do not employ thermal elements or heaters. They are available with precise ratings to the motor, and are provided with time delay characteristics especially suited to trouble-free motor protection.

don't use heat ...USE POWER

Send for Bulletin 1410.

HEINEMANN ELECTRIC CO.

128 PLUM STREET • TRENTON 2, NEW JERSEY

For more facts circle 574 on Reply Card

NEW PRODUCTS

(Begins on page 132)

designed to furnish maximum continuous duty torque from 3 ft-lb in the smaller sizes to 50 ft-lb in the largest, with special electrical and mechanical modifications available.

Advantages listed include an external wear indicator which shows that the brake is operating properly at each engagement; simplified brake adjustment, since one torque-adjustment nut sets it for any rating to maximum and rugged construction with cast iron external parts for severe service. Long brake life and fast stops are said to be provided by a one-piece molded friction lining of low inertia. More information is found in Bulletin 1550. Louis Allis Co.

21—ELECTRIC HOISTS, small push-button controlled

Series 600 Load Lifter Hoists are small, lightweight units of the wire rope and drum type. They are available with lug, upper hook and trolley suspensions in 1000- and 2000-lb capacities and have been developed especially for production lifting

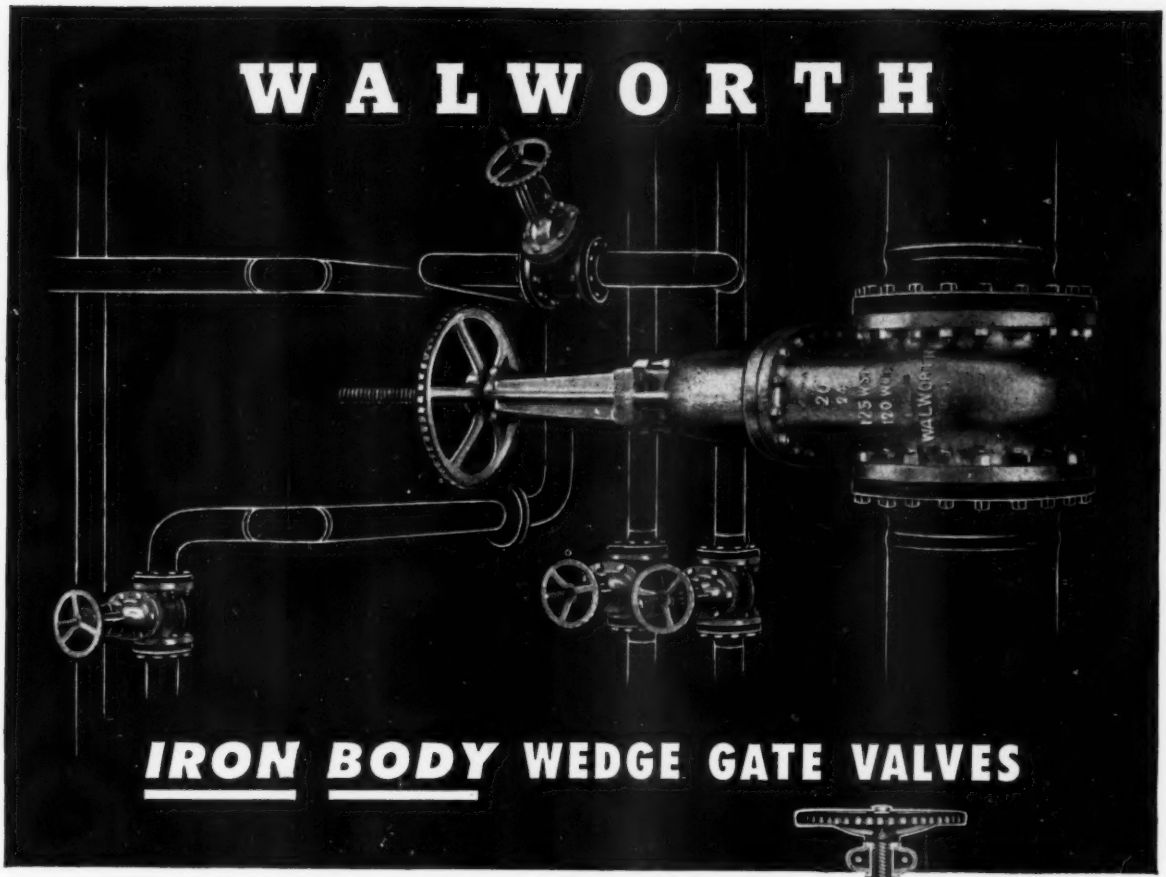
jobs. Construction features announced for them include aluminum alloy frames of unusual strength and shock resistance; double brakes; alloy steel heat treated gearing with machine shave teeth; and magnetic control with only 24 v at the push buttons. The hoists also offer interchangeable suspension and positive upper stop to prevent overtravel of hoist hook, it is pointed out; they are available for standard electric currents. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

22—WATER REPELLENT for brick, other masonry

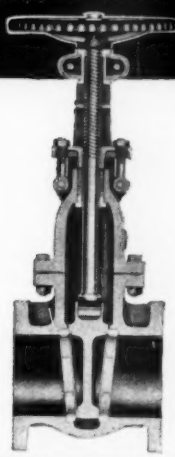
Dri-Film 103, a new silicone water-repellent for masonry is announced as more effective on common brick than previously available materials. This transparent silicone resin is said to prolong the useful life of masonry, reduce maintenance costs, and not only help maintain the masonry's natural beauty but allow it to "breathe" freely after treatment.

Company engineers say Dri-Film 103 minimizes efflorescence, retards spalling and cracking and makes possible cleaner

WALWORTH



IRON BODY WEDGE GATE VALVES



Walworth No. 726F OS&Y (Outside Screw and Yoke) Iron Body Wedge Gate Valve. OS&Y valves are recommended for services where it is desirable that the line fluid does not come in contact with the stem threads. Note the swing-type gland-eye-bolts for easy repacking. Sizes 2 to 30 inches.

Better because ...**The entire valve, from handwheel to seat rings, is ruggedly constructed to withstand rough and frequent usage. Body, bonnet, and yoke are sturdy castings with large radius fillets. Dimensions and drilling of end flanges are in agreement with American Cast Iron Flange Standards. Stiffening ribs connect end flanges with the body neck to maintain a rigid connection with piping.**

A wide range of Walworth Iron Body Wedge Gate Valves is available—through your Walworth Distributor—from which you can choose the right type to meet your most exacting conditions. Saddle-type valves as small as ¼-inch; low pressure valves for water and gas pipelines up to 36 inches.

Whenever you need valves and fittings, choose from complete lines—in a variety of metals—manufactured by Walworth. For more information, see your Walworth Distributor or write: Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

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Information Here

"HOW TO LOWER YOUR COSTS" can have as many answers as there are departments and employees in your plant. A good first move is to ***know*** the equipment available which could raise manufacturing efficiency, cut unit production costs and work for greater employee contentment.

EVERY PLANT EXECUTIVE should have this complete informative CM Catalog at his fingertips. Your copy sent on request.

CM
OVERHEAD
MATERIALS HANDLING EQUIPMENT
HOISTS • TROLLEYS TRAVELING CRANES

CM METEOR
½ to 5 ton capacities. Fast, low headroom heavy duty wire rope electric hoist. Single and two speed models. Many exclusive features.

CM COMET
⅛ to 2 ton capacities. Portable, compact and rugged electric chain hoist. Available in push button and pendant rope control models. Plug in on 110, 220 or 440 volt power lines.

CM CYCLONE
¼ to 10 ton capacities. Lightest weight and most efficient chain hoist. Rugged aluminum alloy construction for heavy duty and long life.

CM PULLER
¾, 1½, 3 and 6 ton capacities. Lifts and pulls at any angle. For 1,001 jobs. Low-cost. Safe and easy to operate.

CM TROLLEYS
Low headroom. Tandem, Matchless and Moore styles. Plain, geared or motor driven.

CM
HOISTS AND CHAIN

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
DISTRICT OFFICES: NEW YORK, CHICAGO, CLEVELAND
In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO
For more facts circle 576 on Reply Card

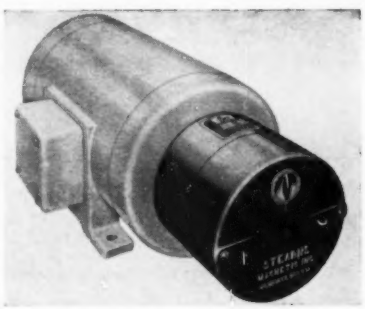
NEW PRODUCTS

(Begins on page 132)

exterior surfaces, when properly applied to above-ground brick, concrete, mortar and other masonry materials. It may be applied by brush or spray; a gallon of diluted material covers 75 to 100 sq ft in one coat, on most surfaces. Test results are reported to show that common brick treated with this material will only absorb 0.01 per cent moisture after being immersed in water for a one-week period. Since rain splashes and runs off silicone treated surfaces—carrying away dirt deposits—exterior surfaces stay clean longer. It is pointed out that peeling and flaking of interior walls is also minimized since the new water repellent reduces the passage of moisture through masonry. And that silicones prevent water mingling with salts inhering in brick and mortar, thus minimizing or eliminating white or yellowish salt deposit marks on masonry surfaces. General Electric Co.

23—DISC BRAKE for re-rated 3- to 20-hp motors

The H-70 Magnetic Disc Brake is for use on re-rated 3-20 hp motors, and is available in maximum torque ratings of 10, 15, 25, 35, 50, 70, 75, and 105 lb-ft. The brake is designed to mount on new frame sizes 213 through 286 and is up



to $\frac{1}{16}$ in. shorter than previous brakes. A new feature of the H-70 brake is the manual release-automatic reset wear indicator. The spring set solenoid released brake is supplied for either horizontal and vertical mounting or independent floor mounting and is available with either standard or dust-tight, waterproof enclosure. Stearns Magnetic, Inc.

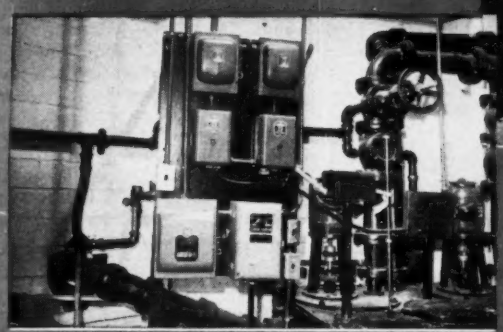
24—PAINT VEHICLES make the paint non-settling

Oil-base paints of a jelly-like consistency — which are non-settling and ready to use when the can is opened — are expected to be available soon. The new products will include flat and semi-gloss paints and enamels and the secret of their storage and performance features is said to lie in the new group of Burnok Vehicles used. According to manufacturer of these thixotropic alkyd vehicles, the paints containing them have several advantages: They need no stirring or thinning and offer color uniformity,

Parlon Stays On!

"Selected over 100 other paints"

FOR STATION CEILINGS—A single coat of paint based on Parlon gives excellent coverage, good reflectance to the station ceilings of Toronto's new $50,000,000 subway. Ten-foot candles of light, glistening walls of bright-colored ceramic tile and stainless steel, and ceilings that will keep that "just painted" look, provide the subway platforms with a sparkling clean appearance.



FOR MAINTENANCE ROOMS—Like the station ceilings, the maintenance room at each station is painted with a Parlon-based paint manufactured by Lowe Brother Company, Limited, Toronto. Again, a single coat was sufficient, not only on the concrete walls and ceilings, but for the duct work and piping as well.

When planning was first begun on the new Toronto subway, more than 4 years ago, one problem was the selection of a suitable paint for station ceilings. After tests conducted with over 100 finishes, a paint based on Hercules Parlon (chlorinated rubber) was the choice.

What Toronto needed was a finish that could be applied quickly — in a single coat if possible, and remain relatively free from condensed moisture during periods of high humidity. The final choice was between the paint of two different manufacturers. Both were based on Parlon!

Wherever exteriors or interiors . . . metal, concrete or wood surfaces . . . must be protected by a finish that withstands corrosion, Parlon-based paints give outstanding service at lower long-term costs. See your paint supplier or write Hercules for details on Parlon-based paints.

Cellulose Products Department **HERCULES POWDER COMPANY** *966 Market St., Wilmington 99, Del.*

LOOK FOR THIS LABEL ON THE PAINT CAN...

MADE WITH **Parlon®**
HERCULES® CHLORINATED RUBBER

PARLON CHLORINATED RUBBER PAINTS ARE AVAILABLE FROM 400 MANUFACTURERS UNDER [illegible]

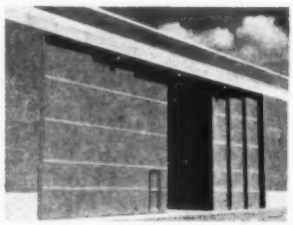
For more facts circle 577 on Reply Card

INTERNATIONAL STEEL COMPANY
2012 EDGAR STREET, EVANSVILLE 7, INDIANA
Send me without cost or obligation my personal copy of the New International Handbook "Doors for Industry and Aviation":
NAME AND POSITION
FIRM NAME
ADDRESS
ZONE
STATE
CITY
This Coupon Brings You New Complete Data on Doors for All Industries
doors

ABOVE: International-built doors for Boeing B-52 Flight Hangar, Seattle, Washington.

LEFT: Battery of International Vertical Lift Doors at large Indiana warehouse terminal.

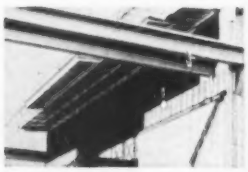
BELOW: Motor-operated International Slide Doors at Oklahoma engineering development center.

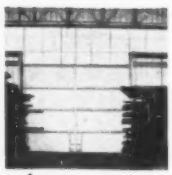


INTERNATIONAL

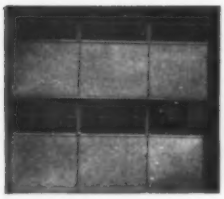
Door Know-How

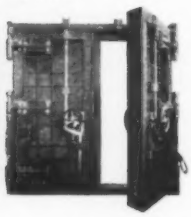
BENEFITS YOU!





ABOVE: Exterior and interior views of 17½-ton International Crane Door at large steel warehouse.





ABOVE: (left) Closed view of International 2-Section Turnover Door. (right) International-built door for jet engine testing chamber.

MULTI-TON HANGAR DOORS FOR GIANT B-52 JETS, motorized or manually operated doors for in-plant and outside installations . . . crane doors, canopy doors, vertical lift and turnover doors . . . they all fall within International's wide experience in designing and building doors for American Industry! This same experience is yours to draw upon when planning an industrial door installation of any type and size. And it has saved many a firm much time and expense! Complete data on the full range of International Doors for all industries are yours for the asking. Simply mark and mail the coupon.

INTERNATIONAL SERVICE

2012 EDGAR STREET • EVANSVILLE 7, INDIANA

INTERNATIONAL STEEL COMPANY

For more facts circle 578 on Reply Card

NEW PRODUCTS

(Begins on page 132)

since the tint color doesn't float at the top of the container. Their hiding qualities are unaffected, and they won't sag, curtain or bead on painted surfaces. They can be brushed or rolled on (even sprayed) and the jellied consistency minimizes dripping. Also, they do not deteriorate on plant shelves.

Paints made with the new ingredients are said to appear "too thick to use," but the friction of the brush action causes them to change to a flowing state. Use of the new vehicles is reported not to be a major factor in the cost of the paints. T. F. Washburn Co.

25—ASBESTOS ROPE offers improved flexible insulation

Caposite Pure Asbestos Rope is designed for the effective flexible insulation of curved and irregular piping, bends, fittings, valves, expansion joints, engine exhausts, and furnace door packing. The rope is described as chemically pure long-fiber Amosite asbestos rovings, twisted together to correct diameter, and retained within a braided reinforcing jacket of asbestos yarn. It contains no organic reinforcing fibers, company states, is lighter in weight than many types of spirally-applied insulation, and affords 2 to 3 times as many lineal feet per pound. According to manufacturer, Caposite Rope cannot rot or deteriorate, insulates up to 1200 F, and can be removed and reapplied repeatedly at temperatures to 750 F. It is available in 100 ft coils, ½ in. to 2 in. diameter. North American Asbestos Corp.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 205-206.

26—REMOTE INDICATOR is small sized, easily read

A miniature remote indicator which has a 5-in. useable scale, but is easily read is announced as having several desirable features, including no parallax and easy "one man" zero adjustment. It has removable units, internal illumination, and flush or semi-flush mountings. These indicators can be supplied as an electric or pneumatic receiver for the measurement of such functions as pressure, draft, flow, level, temperature.

The pneumatic type gage uses as its actuating element a spring-loaded metallic bellows with built-in overpressure protection. Gages can be provided with two units in a single case and two pointers on the single scale. A direct-reading gage, using a bourdon tube, is available for indicating fluid pressures. The electric model uses as its operating

New G-E Electronic Relay: Highly Sensitive to Resistance Changes

SPECIFICATIONS

HIGHLY SENSITIVE

Even a wet thread will provide enough signal to operate this relay.

TWO TYPES OF OPERATION

Relay can be set for either "normal" operation (relay "drops-out" when external resistance is decreased to a value between zero and four megohms*) or "reversed" operation (relay "picks-up" when external resistance is decreased to a value between zero and two megohms*).

*Depending on dial setting.

DIAL ADJUSTMENT

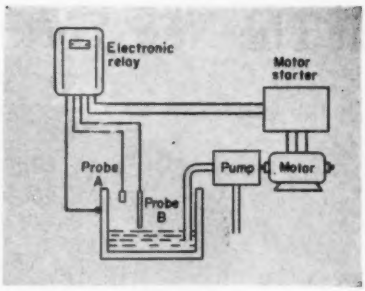
Sensitivity level set by adjusting dial, which can be locked in place. Relay may be remote controlled from as far away as 500 feet.

CONSTRUCTION

Enclosure is weather-resistant and dust-tight (NEMA Type III and V).

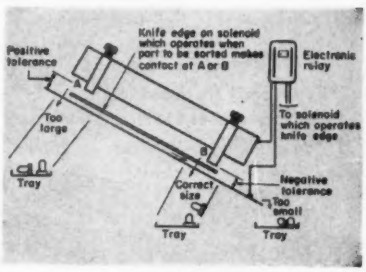
Can Be Used for Liquid-Level Control

This new electronic resistance-sensitive relay can control liquids between two predetermined levels. Relay will start a pump when liquid-level reaches probe A, will continue pumping until liquid falls below probe B. Then it shuts itself off until liquid again reaches probe A. This operation can be reversed to keep the tank full.



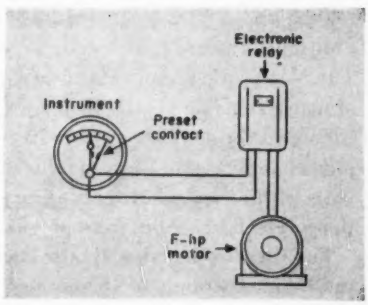
Can Be Used for Sorting Small Parts

Oversize parts touch contact "A," closing electronic relay input circuit. This relay energizes solenoid which directs part into a container for oversize parts. Point of contact "B" is set at standard height less tolerance. Parts touching this contact point are acceptable and are "shot" down another chute. Undersize assemblies do not touch either point and slide to a third tray.



Can Operate from Contact-Making Instruments

The G-E electronic resistance-sensitive relay is able to amplify even the minute currents carried by the delicate contacts of contact-making instruments. For instance, the relay can be arranged so that it will start or stop a f-hp motor directly when an ammeter, voltmeter, or wattmeter reaches the required meter reading.



PHOTOELECTRIC RELAY CR7505-K100

One of a complete line of devices for all photoelectric applications. Inexpensive, has broad application. Bulletin GEA-3533D.

ELECTRONIC TIMER CR7504-A142

Handles timing over three ranges, .06-1.2, .6-12, 6-120 seconds. Highly accurate, versatile. Bulletin GEA-5255B.

FOR MORE INFORMATION, contact your nearest G-E Apparatus Sales Office or authorized G-E distributor, or write General Electric Company, Section L785-4, Schenectady 5, New York, for the following bulletins:

- ☐ Electronic Resistance-Sensitive Relay, GEA-5893
- ☐ Photoelectric Relay, GEA-3533D
- ☐ Electronic Timer, GEA-5255B

NAME..... TITLE.....

COMPANY.....

ADDRESS.....

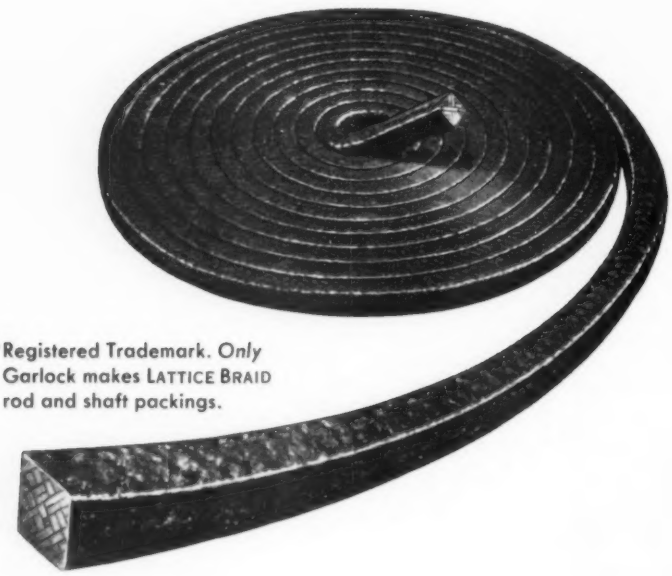
CITY..... STATE.....

ELECTRONIC DEVICES

GENERAL ELECTRIC

For more facts circle 579 on Reply Card

LATTICE BRAID* Packing
helps protect valuable plants at The New York Botanical Garden



*Registered Trademark. Only Garlock makes LATTICE BRAID rod and shaft packings.

Continuous steam heat service is essential during the winter months at The New York Botanical Garden. Any breakdown could cause the loss of many valuable plants. That's why R. E. Wills, Chief Engineer at the Botanical Garden is now using LATTICE BRAID Packing on all expansion joints handling the steam. On this service LATTICE BRAID lasts *two to three years* with no leaks or breakdown. *And* it remains soft and pliable at all times. The best service from previous packings was six to twelve *months*.

Put Garlock LATTICE BRAID Packing to work for your company. All the braided strands of this unique packing are lattice linked together into one structural unit. The strands hold together even when the packing is worn far beyond the limits of wear of ordinary braided packings.

LATTICE BRAID is made from flax, cotton, asbestos, wire-inserted asbestos, Teflon, and asbestos with Teflon impregnation—for various types of services.

Get all the facts about LATTICE BRAID *Packings. Contact your Garlock representative or write for new folder AD-131.*

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK

Sales Offices and Warehouses: Baltimore • Birmingham • Boston • Buffalo • Chicago • Cincinnati • Cleveland Denver • Detroit • Houston • Los Angeles • New Orleans • New York City • Palmyra (N.Y.) • Philadelphia Pittsburgh • Portland (Oregon) • Salt Lake City • San Francisco • St. Louis • Seattle • Spokane • Tulsa.

In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

GARLOCK LATTICE BRAID PACKING

For more facts circle 580 on Reply Card

NEW PRODUCTS

(Begins on page 132)

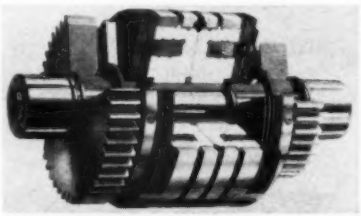
mechanism a motor, electronic amplifier and two differential transformers (one at the transmitter, one at the indicator) forming an electric null balance circuit. Transmitters for pressure, draft, temperature, flow and level are offered. Publication 54-1075-223 gives details on this instrument. The Hays Corp.

27—ALUMINUM ALLOY for conducting electricity

Aluminum Alloy 2EC is described as a tailor-made material developed to meet performance requirements of electrical equipment manufacturing. The new aluminum conductor alloy is said to have superior mechanical properties, with a slight sacrifice in electrical conductivity, over aluminum alloys used for conductor purposes. Such properties are declared important for applications requiring high yield strength and low creep. Aluminum Co. of America.

28—CLUTCH for transmission with constant mesh gear

Developed to meet the requirements of transmissions employing constant mesh gearing, this electromagnetic clutch is designed to provide constant horsepower output, quiet operation and rapid speed change. According to manufacturer, safe



positive operation is assured because the clutch is controlled by a 24-v d-c circuit and no field adjustment of the torque value of the clutch can be made. Also, maintenance is said to be reduced because the clutch is self-compensating and no adjustment for wear of clutch plates is required. Application in the machine tool industry is anticipated for this clutch, as well as its use for automatic transmission requirements. I-T-E Circuit Breaker Co.

29—DUAL CONTROL for compressor operation

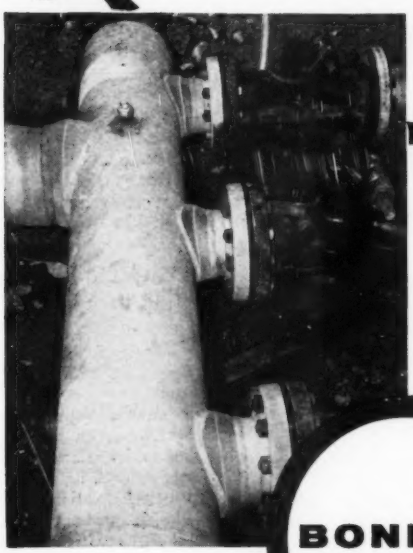
With this new dual control, you can select the most economical compressor operation for both continuous or intermittent air requirements. When compressed air demand is high, the control is set for continuous compressor operation. Company's VD Unloader unloads the compressor when maximum tank pressure is reached. The compressor then idles until additional air is required.

For reduced air requirements, the dual control can be set to operate the compressor intermittently. A pressure switch

YES - 1954 is the year of sharp pencils

FOR REAL SAVINGS IN WELDED BRANCH FITTINGS SHARP PENCILS SPELL...

WELDOLETS



$700 was saved because Weldolets were used on the welded header shown at left. (Actual on-the-job photo.)
Weldolets are available in all principal cities from selective warehousing distributors.

WELDING FITTINGS DIVISION

BONNEY FORGE & TOOL WORKS

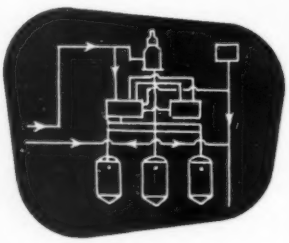
727 MEADOW ST., ALLENTOWN, PENNA.

For more facts circle 581 on Reply Card

How to select a PROTECTIVE COATING

CHECK RESISTANCE TO CORROSIVE MEDIA

How well a coating withstands the action of a given corrosive agent is the first factor you must necessarily consider in choosing the right coating for your needs — but it's *only* the first.



CHECK ADAPTABILITY TO SERVICE CONDITIONS

The second factor — and one you can't always predetermine by laboratory test — is on-the-job performance. That's governed, in turn, by the kind of metal you're protecting . . . the condition of the surfaces . . . how the equipment is constructed . . . conditions encountered during its operating cycle . . . during idle periods — considerations that must be surveyed in detail before you can select a protective coating with reasonable assurance it will successfully meet your requirements.

Dampney equipment-engineered coatings give you that assurance because they are formulated to do certain selective, specialized jobs both large and small, difficult and routine — to give you the protection that is right for you — not in a costly, custom-made material nor an all-purpose anti-corrosive, but in a coating *engineered for the equipment it is to protect.*

Dampney's industrial equipment knowledge is yours to call upon freely. Let us put it to work on your next coating problem.

MAINTENANCE FOR METAL

THE DAMPNEY COMPANY

BOSTON 36, MASSACHUSETTS

140-1

For more facts circle 582 on Reply Card

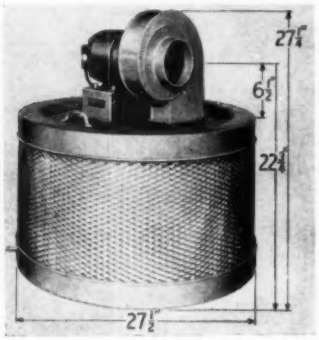
NEW PRODUCTS

(Begins on page 132)

shuts off the compressor motor when required tank pressure is reached; starts it when more air is required. This dual control can be added to any of this manufacturer's units equipped with loadless starting. Quincy Compressor Co.

30—VAPOR COLLECTOR now has broader application

Increased suction plus a self-clearing paddle wheel type fan that can handle solids from wet machining operations are reported features of recent changes in the Model VCS-2 Dustkop Vapor Collector. It is claimed that the new type of fan increases the amount of suction



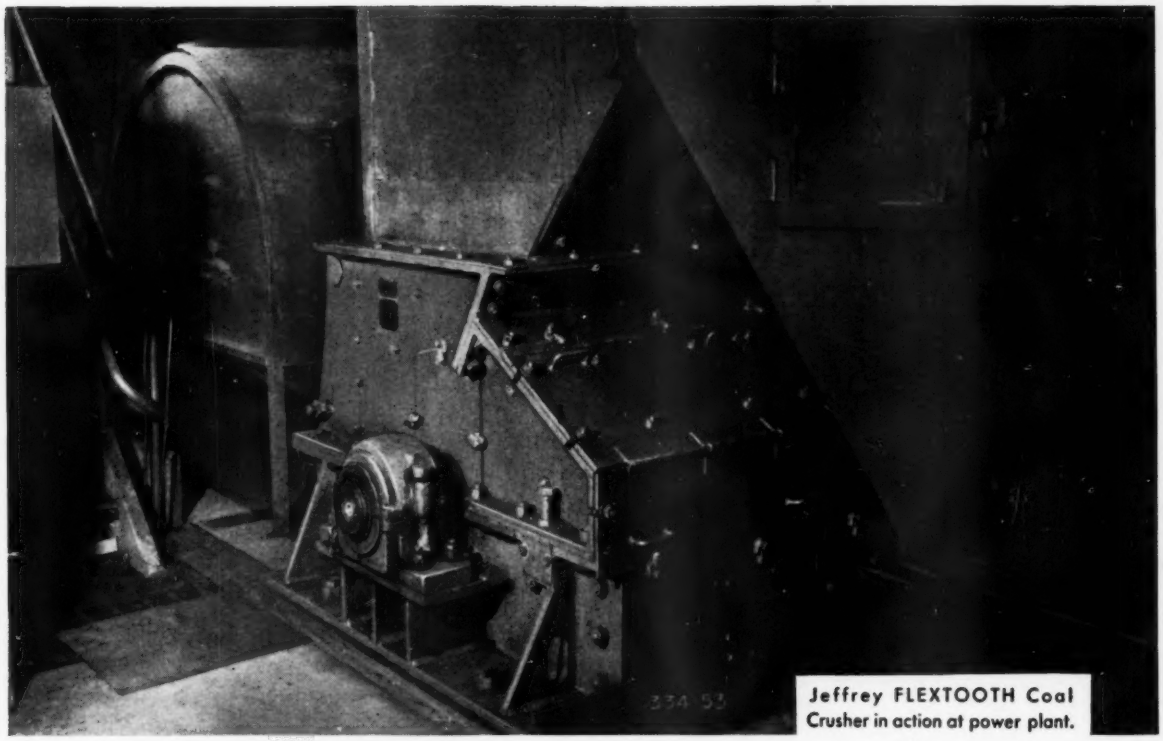
at the source of the mist and spray and clears itself of any solids present . . . as generated in certain newer grinding techniques. Vapor collectors on such operations collect a combination of mist and grit which forms a semi-solid grease, company explains. Added to this are bits of string which wear off the abrasive belt during the operation.

The new rating for this collector is 614 cfm with 5-in. inlet developed by the paddle wheel fan which is direct driven by a ⅓ hp continuous duty motor. Mounting space required is 28 by 28 in. by 28 in. high. The collector is usually located overhead so that condensate may return by gravity to the sump of the machine. Aget-Detroit Co.

31—GRAPHIC PANEL for ion exchange equipment

With this panel arrangement the operator can see at a glance how the system is functioning. On the panel control board, in addition to the usual controls, meters and recorders, is a pictorial representation of the ion exchange units and the immediate piping and valves. Each valve representation has two colored lights, one red, one green. When the operation valve is open, the green light is on; when it is closed, the red light is on.

Pipe lines are also lit and colored, with a different color for each material being carried — as acid, inlet water, etc. Where a line carries two materials, a different color or pictorial arrangement is used to indicate this also. This arrange-

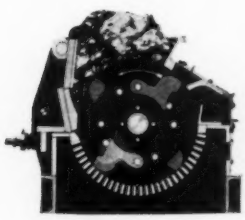


Jeffrey FLEXTOOTH Coal Crusher in action at power plant.

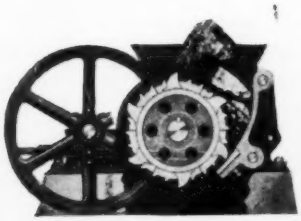
JEFFREY coal crushers insure constant supply of right sizes

Jeffrey's long experience with crushing problems assures that the coal sizing installation for *your* power plant will give greatest profit and satisfaction. Our engineers have developed a complete range of crushers that produce a constant supply of uniform sizes for top operating efficiency.

Jeffrey FLEXTOOTH and Rotary Ring Crushers were especially designed for stokers and powdered fuel plant grinders.



FLEXTOOTH Coal Crusher



Jeffrey Single Roll Crusher

CHECK THESE TEN OUTSTANDING FEATURES:

1. Reduces run-of-mine coal in one operation down to and including ¼".
2. Rugged construction with all-welded steel frame.
3. Highest grade roller type bearings.
4. Renewable steel crushing elements swing back on contact with tramp iron.
5. Heavy fly wheel pulley furnishes belt drive direct to motor.
6. Hinged breaker plate gives easy access to interior from front.
7. Built-in metal catcher may be emptied easily without stopping production.
8. Hinged doors at back have T headed bolts and latches. No bolts to lose when doors are opened.
9. Low frame requires no more head room than ordinary crusher.
10. Large screen bar area assures large capacity and uniform product.

WRITE FOR CATALOG 784-B

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED

. . .IT'S A JOB FOR JEFFREY!

For more facts circle 583 on Reply Card

Safer than Slippery Flooring

A matador is aware of the risks in his job but because SLIPPERY FLOORS GIVE NO WARNING—often look safe—workmen can be killed or hurt before they know *their* danger! A practical remedy is A. W. SUPER-DIAMOND—tough, rolled-steel floor plate with an exclusive, engineered raised-diamond surface. SUPER-DIAMOND puts 40 anti-slip traction points in every foot-step—gives maximum foot safety at low cost. Investigate SUPER-DIAMOND for accident prevention. Write for new Booklet SD-5.

A.W. SUPER-DIAMOND

Economy Rolled Steel Floor Plate

ALAN WOOD STEEL COMPANY

CONSHOHOCKEN, PA.

Other Products: A.W. ALGRIP Abrasive Rolled Steel Floor Plate Plates • Sheet • Strip • (Alloy and Special Grades)

For more facts circle 584 on Reply Card

NEW PRODUCTS

(Begins on page 132)

ment is reported especially advantageous for large utility demineralization plants, mixed-bed and two-bed demineralizers and hydrogen-sodium blend systems. It can be modified to individual plant needs. Graver Water Conditioning Co.

32—FLOOR MACHINE for heavy-duty cleaning jobs

A heavy-duty floor machine with a 22-in. diam brush, the Model K-22 is announced as especially suited for hard-to-clean floors and large floor areas. According to manufacturer, the 1-hp motor is offset to counterbalance handle weight and minimize sidewise pull. This is designed to reduce operator fatigue, prolong brush life, and provide all-weight-on-the-brush efficiency. Heavy grease accumulations can be dry-scrubbed with a special multiple brush that is self-sharpening and self cleaning, it is pointed out, although the machine can be used for wet scrubbing when needed.

The Model K-22 incorporates cushioned gears, enclosed motor and sealed gear chamber. The handle is adjustable to suit the height of the operator. In operation, the machine is designed to balance a full 130 lb on the brush—then spin that weight at 160 rpm to cover a full 22-in. diam floor section with every sweep. The Kent Co.

33—AUTOMATIC LEVEL is fast and easily used

Claimed to be more accurate and faster than many leveling methods and as simple to sight as a camera, the Crowley Compactic is offered as a low-cost instrument for all leveling purposes. It is designed for equal ease of use and accuracy for sighting as close as 6 in., or as distant as 100 ft. or more. In this instrument

a mirror system provides a split circular image of the horizontal target. In one semi-circle, it is seen upright; in the other, upside down. Thus, the two halves of the target appear in the eyepiece separated by twice as much as the target is actually off-level, it is explained; this doubles the sensitivity and leveling accuracy of the instrument. It is ready for use when placed on the tripod or wall-top stand. On signal, the assistant raises or lowers the target on the staff

6 STAR FEATURES

WHO SAID THERE'S NOTHING NEW IN CENTRIFUGAL PUMPS

B & G SERIES 1510
TYPE B CENTRIFUGAL PUMP

Years ahead! A VERTICAL split case pump with balanced loading of impeller and bearings...capable of handling loads far in excess of those produced by any pump and motor combination! Easily serviced without breaking pipe connections!

1. **Solid-type Volute with Support Foot.** Can be left in pipe line when servicing pump—rugged construction absorbs piping strains.

2. **Removable Bearing Frame.** Complete bearing frame, including seal and impeller, can be removed without disturbing piping or motor leads. The bearing frame is replaceable and interchangeable on all sizes.

3. **Leak-proof Mechanical Seal.** Features the exclusive, harder-than-glass B&G "Remite" insert. This Seal Construction has enabled nearly two million B&G Pumps to make an amazing record for failure-proof performance.

4. **Hydraulically Balanced Impeller.** Balancing chamber and pressure relief holes in the impeller reduce thrust to a minimum, lengthening pump life.

5. **Anti-Friction Roller Bearings.** Timken Bearings handle thrust and radial loads for smoother, quieter, more efficient operation.

6. **Oil Lubrication.** No messy, undependable grease cups—circulating oil lubrication assures positive protection to bearings. Oil level indicator permits visual check.

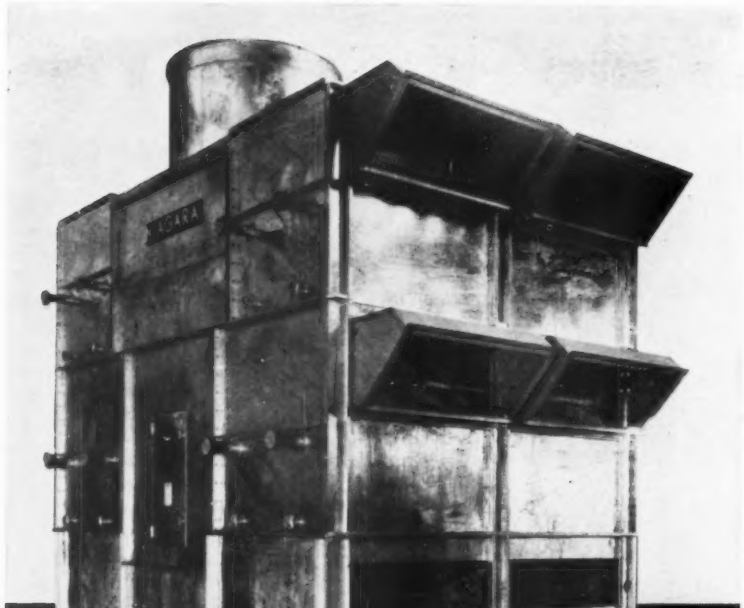
SEND TODAY FOR SIZE AND CAPACITY DATA

BELL & GOSSETT
COMPANY

Dept. DP-53, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Drive, Toronto, Canada

For more facts circle 585 on Reply Card



NIAGARA Aero HEAT EXCHANGER

Thirty Million B.T.U. CAPACITY

with Precise Control of Temperature in Cooling

The NIAGARA Aero HEAT EXCHANGER cools liquids and gases by evaporative cooling with atmospheric air, removing the heat at the rate of input, controlling temperature precisely. You save 95% of cost of cooling water; you make great savings in pumping, piping, power; quickly recover your installation cost.

You can cool and hold accurately the temperature of all fluids, air and gases, water, oils, solutions, chemical intermediates, coolants for mechanical, electrical and thermal processes. You obtain closed system cooling free from dirt. You solve all the problems of water availability, quality or temperature.

In CHEMICAL PROCESSES this is successfully used in cooling liquids and gases, chemical reactions, condensing distillations and reflux cooling.

Write for complete information; ask for Bulletins 120 and 124. Address Dept. PE.

NIAGARA BLOWER COMPANY

405 Lexington Ave. New York 17, N. Y.

District Engineers in Principal Cities of United States and Canada

For more facts circle 586 on Reply Card

NEW PRODUCTS

(Begins on page 132)

until the halves of the target line meet. Then the height can be read on the back scale of the staff.

Mechanism mounts and housing are integrally die cast of aluminum — the instrument weighs only 2¾ lb. Even with tripod, target and staff, the total weight is less than 7 lb. Accessories for the Compactic include staff and target, tripod, wall-top stand, staff, extension rod, and instrument and accessory carrying cases. An illustrated bulletin gives data. Compactic Div., Engis Equipment Co.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

34—WOOD LADDER is laminated for more strength

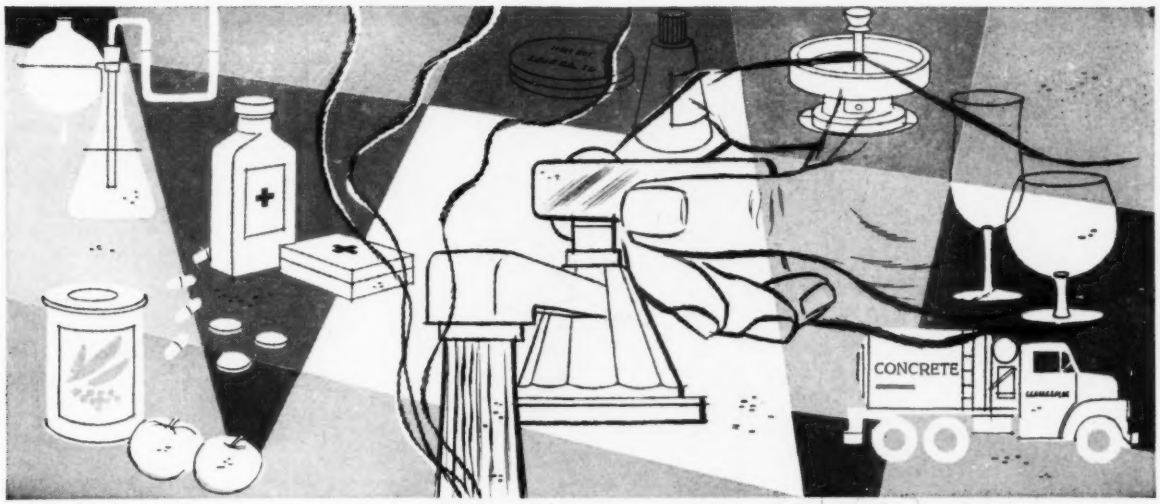
This laminated wood ladder is claimed to be more than twice as strong as the standard type having solid wood beams. Key to its greater strength is its composite wood beam construction, made possible by modern glues and gluing techniques applied to ladder construction. It is similar to that used by fabricators of glulam wood arches and trusses for the construction industry. Long life expectancy, non-conductivity and durability are other advantages announced for this ladder. Timber Engineering Co.

35—PAINTING TECHNIQUE for interior aggregate block

This new technique is said to eliminate the voids and honeycombs typical of interior aggregate block surfaces. Designed to give a washable finish in one application on concrete block, cinder block and other light-weight aggregates, the specification is a mixture of a powdered marble base paint with a concentrated latex alkyd-resin paint. It combines filling properties of one material with the spreading and application ease of the other. Cost estimates are reported to show that a mixture of 6 lb of the alkyd paint can be applied at a cost of marble base filler with 1 gal of the latex-3.45c a square foot for materials and 2.1c a square foot for labor, or a total cost of 5.55c. Literature giving procedure is available. Luminall Paints Div., National Chemical & Mfg. Co.

36—PROTECTIVE TAPE guards smooth surfaces in storage

Scotch Brand Protective Tape 344, is announced for protecting smooth surfaces during storage, shipment and fabrication. This new black paper tape is believed to be the first tape of its kind to be entirely resistant to outdoor weathering for pe-



Do any of your plant applications require *Special Temperatures?*

Let us show you how ONE tank simultaneously provides water at 180° for sanitizing—140° for other uses!

Here's a system that's specifically designed for the hot water "problem-child." So if yours *is* a problem, you can appreciate the importance of a continuous supply of hot water at *two* different temperatures: *Sanitizing* hot water anywhere it's needed; *tempered* hot water where it's wanted.

Ruud-Monel two°°temp Sanimasters supply *both* these temperatures *from the same tank at the same time!*

Hot water at *any temperature* for commercial and industrial processes

Some of its many applications: Chemical processing; food processing; glass polishing and cutting; manufacture of cosmetics and pharmaceuticals; concrete mixing; heating oil for processing; metal cleansing operations; bottle washing; de-aerating transformer oil; laboratory use; indirect heating of industrial liquids such as electroplating baths, soap kettles and water-purifying chemicals—*wherever* you need hot water at a selected and constant temperature.

Rust-proof Monel—the Wonder Metal —*safely holds water at 180°!*

Will not rust, ever. Ruud-Monel Sanimaster, with its exclusive, long-life Monel tank, provides sparkling hot water for years and years.

180° SANITIZING HOT WATER is piped directly into operations requiring it. This extra-hot water provides positive bacteria destruction, perfect sanitation.

140° GENERAL-USE HOT WATER always on tap. For Bradley wash fountains, first-aid rooms, lavatories, showers... anywhere you need regular temperature hot water.

FREE CONSULTANT SERVICE!
A Ruud engineer will gladly analyze your specific hot water problem. Or, if you prefer, we will send you literature.

Mail this Coupon Today!

RUUD-MONEL
two°temp
SANIMASTER

RUUD MANUFACTURING COMPANY
Dept. D-12, 2934 Smallman Street, Pittsburgh 1, Pa.

☐ Please have a water heating engineer call on me
☐ Send me literature

Name _____ Title _____

Business Name _____

Street _____ City _____ State _____

For more facts circle 587 on Reply Card

Torque-Control*
ALL-O-CRANES
Pneumatic tires cushion shock on travel mechanism—far less maintenance!
* TORQUE-CONTROL MEANS
CONTROLLED POWER!
—exactly enough for each load! no more, no less
TON CRANE AND SHOVEL CO.
608 S. DEARBORN ST., CHICAGO 5, ILLINOIS
For more facts circle 588 on Reply Card

NEW PRODUCTS

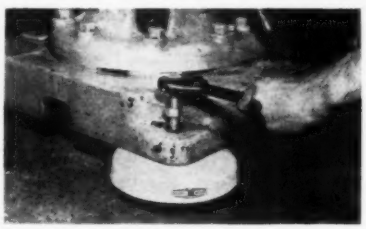
(Begins on page 132)

riods up to 6 mos. The tape—designed to protect polished surfaces against scratches and die marks—features a film-like adhesive that sticks upon contact to such materials as stainless steel, aluminum (not anodized), glass, most plated metals, plastic glass, polystryene, and polyester.

It is explained that although the tape's black paper backing resists abrasion, occasional fractures in the backing do not harm the rubbery adhesive which stretches to continue protecting the covered surface. The new tape is available in 100 yd rolls in standard widths of 12-, 24-, and 36-in., and other widths are available on special order. Minnesota Mining and Mfg. Co.

37—MACHINERY MOUNTS for loads up to 10,000 lb

A new larger Leveling Barrymount, the LM7 is available for carrying up to 10,000 lb per mount. Like this company's other self-leveling mounts, the new one is designed to let heavy machinery be installed and levelled within minutes, without bolting or shims. In addition

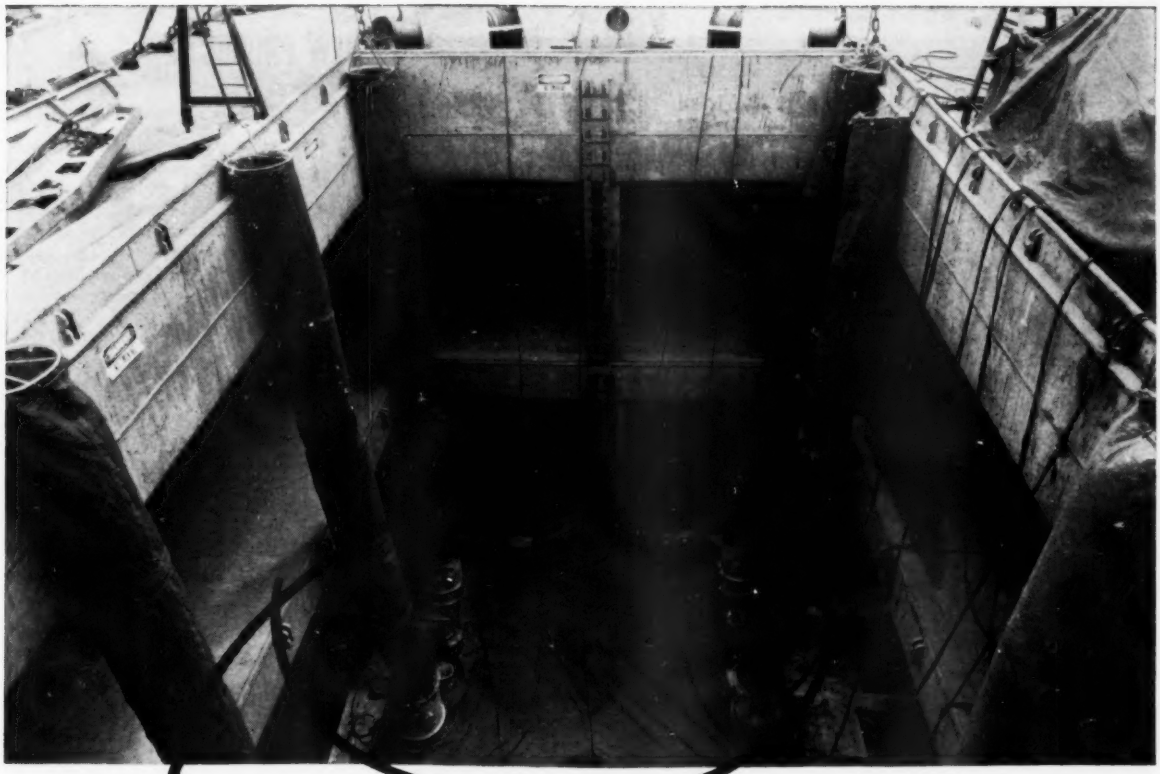


to the mobility afforded machines, these mounts are said to offer several other benefits, including low installation costs and less wear and tear on adjacent machinery and on the plant structure itself, because the Barrymounts isolate impacts generated during machine operation.

Better machining accuracy and better working conditions due to reduced noise are other advantages cited for these mounts. Also, there is claimed to be no "floor walking" of heavy machines, because these isolators absorb all modes of vibration (horizontal, vertical, rotational). The mounts are designed to permit height adjustment for leveling up to ½ in. The Barry Corp.

38—GATE VALVES are designed for longer service

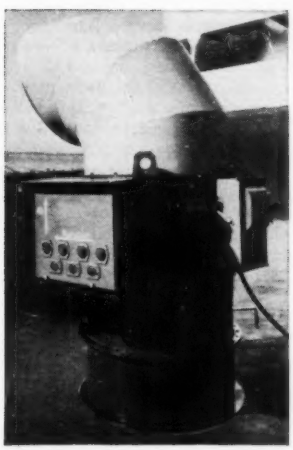
Longer-wearing wedges, stronger stem-to-wedge connections and a union bonnet for increased efficiency are new design features announced for these forged steel gate valves. The wedges are made of 13 per cent chrome stainless steel for corrosion resistance and duracased to 1000 Brinell hardness to prevent galling and excessive wear caused by closure upon abrasive particles in the flow. The stem-to-wedge connection increases pull-out strength to many times



Ventilation for Spray Painting

. . . A JOB FOR JOY AXIVANE® FANS

Unexcelled performance in tight quarters, plus rugged compactness and fast, easy installation and relocation of the units when necessary . . . those were the main reasons why Joy Series 1000 Axivane Fans were selected for the vital job illustrated above. They're exhausting toxic, explosive fumes from spray-painting operations in enclosed areas below-decks in a large ship. Canvas ducts carry the fumes to open air on an upper deck.



Another shipboard job: a deck-mounted Series 1000 Fan provides air circulation in ballast tanks—5000 cfm at 3" pressure.

Applications like these effectively demonstrate the inherent advantages of Joy fans. Their vaneaxial design is highly efficient, yielding a maximum air volume-to-power ratio. Blades are of true airfoil shape, and are readily adjustable for maximum flexibility to meet varying conditions. Thick steel casings are used in the sturdy construction that smothers operating noise.

Series 1000 fans are available in 136 models, from 18" to 84" in diameter. Duties range from 600 to 200,000 cfm, and from .125" to 11" total pressure. They're easily installed right in the duct in horizontal, vertical or inclined positions with direct drive, and available also with V-belt drive. ● Let's talk over *your* fan problem—or write for Bulletin J-611. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

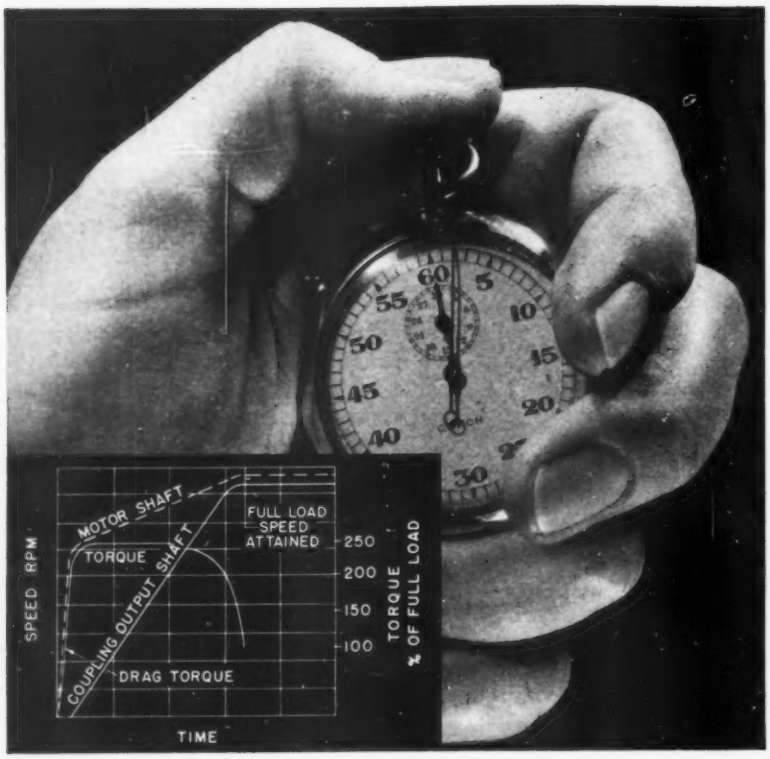
Consult a Joy Engineer

JOY

W&D 15301

WORLD'S LARGEST MANUFACTURER OF VANEAXIAL-TYPE FANS

For more facts circle 589 on Reply Card



How to get your motors out of the high heat curve... *fast*

Thousands of equipment owners have already proved it: the fastest way to get a normal induction type motor "out from under the load" and up to normal rpm—and keep it there without shocks and vibrations—is through the fluid "slip" within a Twin Disc Double-Circuit Fluid Coupling.

By *eliminating* mechanical connection, Twin Disc Fluid Couplings permit *full acceleration of motor under load within a few seconds* . . . while the output shaft of the fluid coupling transmits *full* input torque of the motor, and brings the load up to speed *smoothly* and *gradually*.

In addition, Twin Disc Fluid Couplings offer such advanced performance features as *Double-Circuit design* . . . making them the *most efficient fluid drives available today.*

Write Twin Disc—Dept. DS, Racine, Wisc.—for *complete* information! Ask for Bulletin 144-D.

Twin Disc Fluid Couplings are available in 9 different types (HYDRO-SHEAVE® Drive is shown), with the broadest variety of input, output combinations, and in sizes from 7.4S to 27 to accommodate motor- or engine-installations from fractional to 850 hp.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
Hydraulic Division, Rockford, Illinois

For more facts circle 590 on Reply Card

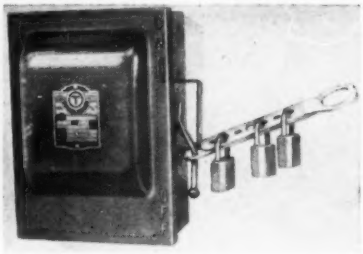
NEW PRODUCTS

(Begins on page 132)

the theoretical requirement, manufacturers say, and distributes pull-out load more efficiently throughout the wedge structure. In the union bonnet construction a body-to-bonnet joint provides a recess for the gasket, seating it accurately and more securely to reduce possibility of leakage and blown gaskets. Bulletin 195 furnishes more details on these valves. The Ohio Injector Co.

39—MULTIPLE LOCKOUT for fuse and switch boxes

Used as a safety procedure when working on machines and equipment controlled by a common switch box, this device prevents others from throwing the switch while work is still being performed. It allows up to six padlocks, so that where



a number of men are working on the operation current may not be turned on until the last man has completed his work and removed his padlock. Fabricated of steel, zinc-iridite plated, it opens and closes scissors fashion, with jaws at either end providing a lock around the switch levers, handles, and lock holes. It weighs only 10 oz, is 8-¼ in. long. Industrial Products Co.

40—PALLET TRUCK, lightweight, carries 1-ton loads

A lightweight hydraulic pallet truck for use with single and double face pallets and skid platforms is designed to carry 2000-lb loads with a minimum of dead weight. With forks 48 in. long and 27 in. wide, it weighs only 250 lb. Advantages cited are: rugged construction and ball bearings in front and back wheels allow easy movement; no grease points; sealed bearings or self-lubricating bronze bushings throughout; hydraulic lifting pedal located by operator's right foot for convenient pumping. The truck comes in six fork lengths, 32 to 60 in.; six widths, 18 to 30 in. It has rubber-tired front, aluminum rear wheels. Lewis-Shepard Products, Inc.

41—V-BELTING, molded, offers improved performance

For sewing machines, printing equipment and similar applications, this new V-belting is claimed to stretch less than many beltings, and to resist slippage, oil, and heat. Also, its improved fabric-

They thought they needed 3 trucks

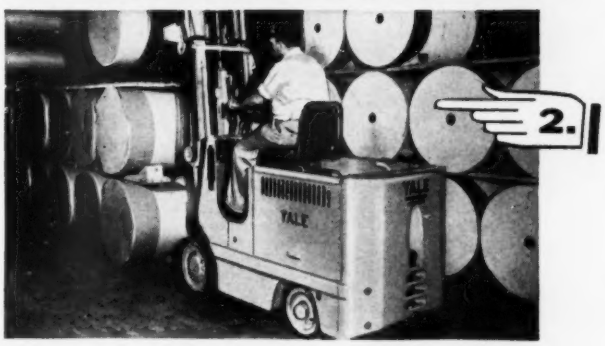
. . . but Yale showed them the one Truck that did all 3 jobs

The experience of many firms shows what can be done in your own plant. For one YALE Truck . . . *with the proper Yale attachments* . . . can do virtually every lifting, moving, and stacking job . . . easily, efficiently, and economically. And, every Truck in the complete YALE line can quickly be fitted with the use-extending attachments that your operation requires.

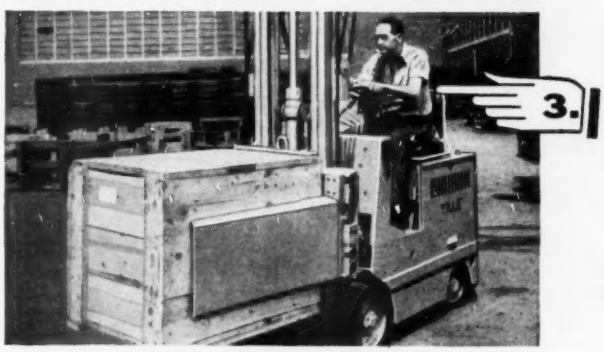
You can now acquire the YALE equipment you need without delay and without major investment under YALE's flexible "3-Way-Finance-Plan." Ask your local YALE representative for details. Or mail the coupon today.

YALE *MAGNETIC* CAM-O-TACTOR—**a time-delay speed controller with exclusive features no other controller can match—provides smooth acceleration, long contact life, trouble-free operation.**

1. **A host** of handling jobs like the one illustrated require no special attachments . . . can be economically performed by the YALE Electric Truck alone.



2. **The revolving** clamping device on this YALE Electric Truck handles huge paper rolls with tender care. Rolls can be stacked either flat or up-ended.



3. **Handling large,** bulky units is no problem for the Electric Truck and clamping device. Like all YALE attachments—it's installed or removed in minutes.

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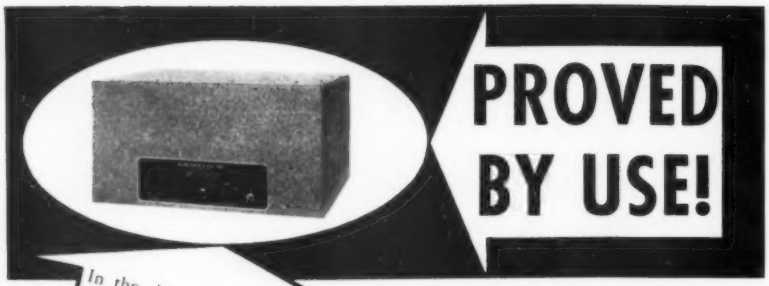

PROVED BY USE!

In the short time the Model 1001 Regulator has been on the market, more than 300 of the instruments have been sold, mainly for meter calibration applications and for use in standards laboratories.

As a result, it can now be said — *and proved* — that the Model 1001 gives hairsplitting precision *with the rugged dependability of operation associated with voltage regulators of "ordinary" regulating accuracy!*

0.01% regulation accuracy!
1000 VA capacity!

Sorensen Model 1001
electronic AC Voltage Regulator

specifications

Input	95-130 VAC, 1ø, 50-60~
Output	110-120 VAC, adjustable
Load range	0-1000 VA
Regulation accuracy	±0.01% against line and ±0.01% against load guaranteed at room temperature, for a resistive load, an input variation of ±10% and over a 2-to-1 load change. For all other conditions within the specifications the 1001 has a proportionate amount of accommodation.
Distortion	3% RMS maximum
P. F. range	0.95 leading to 0.7 lagging
Time constant	0.1 second
Tube complement	6SL7GT (1), 6L6GA (1), 5Y3GT (1), 2AS15 (1)

Even greater capacity with similar accuracy will be available this fall when the Sorensen Model 2501 Regulator — ±0.01% accuracy, 2500 VA capacity — goes into production.

general catalog available

AC VOLTAGE REGULATORS — 150VA to 15000VA capacities, 115 volt and 230 volt output, 400-cycle regulators, 3-phase regulators

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NOBATRONS — Regulated low-voltage, high-current DC sources

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NOBATRON-RANGERS — Wide-range variable DC sources

TUBELESS DC SUPPLIES — Magnetic amplifier supplies with various outputs and capacities

AIRBORNE FREQUENCY CHANGERS & INVERTERS, MILITARIZED REGULATORS, FILTERS, TRANSFORMERS, AND RELATED EQUIPMENT.

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SORENSEN

375 FAIRFIELD AVENUE, STAMFORD, CONN.

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NEW PRODUCTS

(Begins on page 132)

and-neoprene construction is designed to resist hook pull-out. Secret of its improved performance is said to lie in the fact that the belt is completely molded — providing a uniform cross section. A 100-ft package of the new belting affords ease of storage and convenience in cutting the right length. Splicing is accomplished by means of wire belt hooks. Boston Woven Hose and Rubber Co.

42—PROPORTIONING PUMP offers control accuracy

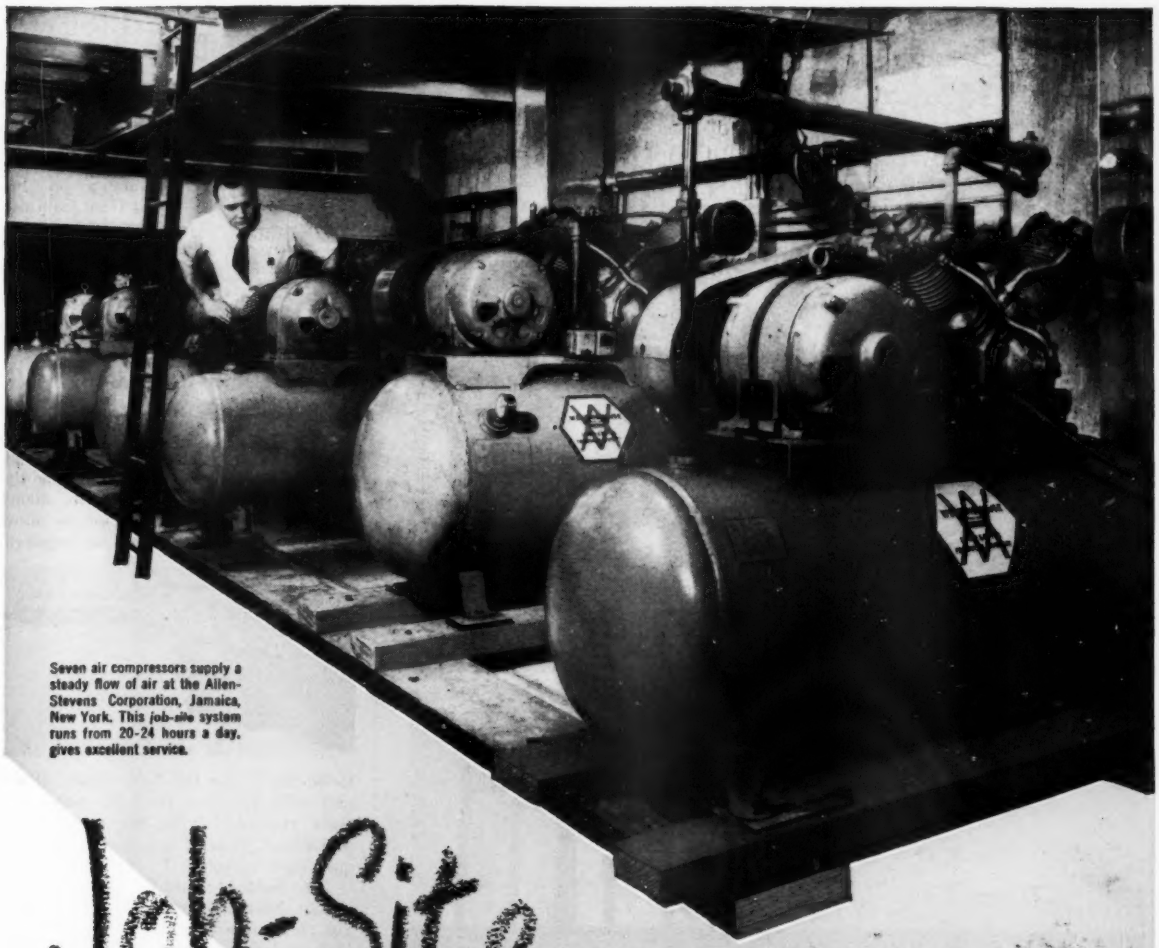
The Hills-McCanna Meter is announced as a packless, positive displacement, fully enclosed unit. Its design makes possible a wide output flow range adjustable by finger pressure while the pump is operating or stationary. It is claimed it will meter quantities from 5 cc to 6 gph per feed, depending on material handled. Under actual operating conditions, however, the pump is reported to have handled quantities as low as 3 cc successfully. Standard speeds range from 27 to 900 strokers per minute, it is stated, and at the higher speeds and capacities particularly, the flow is continuous for all practical purposes. Gases and vapors are vented automatically. Standard units develop pressures to 2500 psig.

Design of the pump is such that the pumping element is sealed and leakproof, says manufacturer, and although completely enclosed, the unit is easily serviced. Regulation is adaptable to automatic control, utilizing direct instrument air signal. Valves are self-cleaning, high speed type. Company points out that alloy in contact with fluid being pumped is small in quantity and a complete changeover for handling a fluid requiring another alloy can be accomplished at minimum cost. The pump is also adaptable to ganging in an arrangement wherein additional units are connected to the basic one; additional motors and speed reducers are not required. Hills-McCanna Co.

43—IMPROVED CORES give more heat transfer surface

Monofin Cores are plate type fin and round tube cores, made up of seven fins per inch. They are reported to provide 58 per cent more extended surface and seven times more heat transfer surface than circular fin cores. The new cores are adaptable for engine cooling units, for cooling oil, gas, and compressed air, and for air conditioning heating and cooling functions. Monofins afford reduced maintenance and replacement costs, it is said, and tubes sheathed with them are removable when damaged, maintaining full heat transfer efficiency of the entire core area. Straight-in-line fin arrangement is designed to permit maximum air flow for efficient cooling with minimum pressure drop, resulting in savings in horsepower and greater fin cleanliness.

Company points out that Monofins



Seven air compressors supply a steady flow of air at the Allen-Stevens Corporation, Jamaica, New York. This job-site system runs from 20-24 hours a day, gives excellent service.

Job-Site compressor plants

keep pressures UP...keep air costs DOWN

• Use several small air compressors instead of one big one and you'll reduce operating costs and repairs—and keep production running smoothly.

Several small compressors, piping air through a common manifold or to individual groups of equipment, give you continuous service. You're never without air. When one compressor plant is down for routine maintenance the others can carry the load temporarily. When air requirements slack off, during night shifts or seasonal periods, some of the compressors in the gang can be shut off to reduce wear and operating costs. And, when air requirements exceed the present capacity another small compressor can be added—economically.

When you plan your *job-site* air supply, be sure to use dependable Westinghouse Air Compressors. They come in a wide range of sizes — you can get just the type and capacity you need. And, for trouble-free service look at these Westinghouse exclusives: *controlled pressure lubrication* . . . oil is fed under constant pressure to moving parts; *low oil level protection* . . . air cannot be pumped until the oil is at the proper level; *positive starting unloader* . . . loading will not start until the motor has reached its rated speed.

Your Westinghouse Air Compressor distributor has a complete stock of compressors and accessories. He can give you fast, efficient repair service, and a complete survey of your air requirements.

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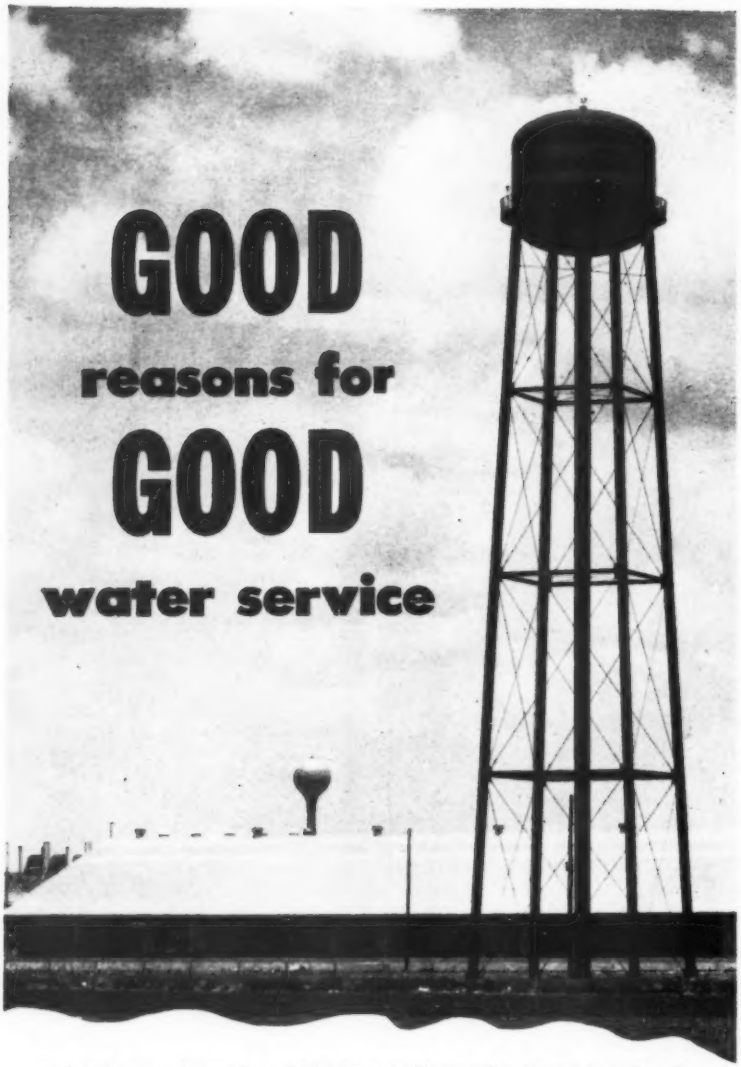

★ Shown above is a 100,000-gal. Horton® elevated tank of ellipsoidal-bottom design and a 50,000-gal. Horton Watersphere® at the Western Cotton Oil Company, Lubbock, Texas. With another 100,000-gal. Horton elevated tank, not shown, they are good reasons why this Texas plant is assured of a dependable gravity water supply twenty-four hours a day.

Often, one Horton elevated tank of the proper size will handle all the water needs in a private or municipal water system. In other cases, as here, greater efficiency is obtained by the proper dispersal of more than one structure.

Whatever the situation at your plant, there is a Horton elevated tank, Watersphere, standpipe or combinations thereof to help assure you of a dependable gravity pressure water supply for fire protection and general service.

Write our nearest office for estimates or quotations.

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Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

NEW PRODUCTS

(Begins on page 132)

have positive mechanical bond, with fin-collar to fin-collar contact along the length of the tube—adding to bursting strength and protecting it from injurious impingement and atmospheric corrosion. They are available in copper, brass, Admiralty, aluminum or stainless steel tubes, and copper and aluminum fins for every type of service. Catalog 5554 gives more information. Young Radiator Co.

44—SOLDERING GUN is self-feeding electric unit

The Scotty Soldering Gun feeds spool solder (acid, resin or plain type) through the upper tube to the hot soldering tip. The solder strip ($\frac{1}{16}$- or $\frac{3}{32}$-in. diam) is controlled by trigger action to allow a small or large quantity, as required,

to be fed to the tip. The picture of the unit with the snap-on back plate partially removed shows the solder spool in position. A used one can be replaced quickly, it is noted.

The Scotty comes equipped with a wedge shape, half round for copper tubing, or pointed soldering tip for use with explosion rivets. It is also furnished with 50-, 100- or 150-w heating elements. Light in weight, this aluminum gun can stand by itself, manufacturer points out. Scotco Products Co.

45—CAPACITOR for indoor or outdoor application

These weatherproof capacitors are for use on 460-v distribution systems. Their compact design in a wide range of ratings suggests their use for power-factor improvement on isolated installations. When connected on the load side of the motor starter, there is no need for a separate switch, company points out. Aluminum-case construction provides protection against corrosion or atmospheric conditions; and a flexible cable allows installation by direct or conduit connection. All units are three-phase 460 v. The smaller unit is rated at 2 and 3 kvar; the larger is rated at 4, 5 and 6 kvar. Westinghouse Electric Corp.

46—SPEED REDUCERS designed for vertical mounting

Vertical Shaft-King Speed Reducers are shaft-mounted units designed for applications where the driven machine shaft is in a vertical position or nearly so, such as on mixers, agitators, and liquid processing machines. These units, available

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Type 1300 KIMWIPES!

You'll be money ahead when you switch to Type 1300 Kimwipes. They're the modern new disposable wipers that actually replace old-fashioned cloth and waste wiping material and cost four to ten times less!

New Kimwipes 1300 are soft. Strong. Absorbent. A full 12″ x 18″ in size, they hold up to 8 times their own weight in liquids. They're non-abrasive, too. There's no holdover of metal chips or other infectious material that may cause dermatitis and loss of man hours. Type 1300 Kimwipes are absolutely clean to start with, and are disposed of after use. Ask your salesman for samples. And remember, there are two other kinds of Kimwipes you can choose from: Type 900-S (optical wipers) and Type 900-L (regular wipers). Save money. Order today!

Kimberly Clark
INDUSTRIAL WIPERS
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Kimberly-Clark Corporation • Neenah, Wisconsin

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Five fact-filled days at the Power Show can save you months of tiresome and expensive research by providing the ideas for your improved plant operation.

Visit the technically staffed booths of the country's leading manufacturers of mechanical, steam, electrical, hydraulic and pneumatic power equipment for the latest word in power technology.

You will learn how to increase production, improve product design and reduce maintenance costs at a minimum expenditure of your valuable time.

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Write early for hotel reservations and advance registration

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NEW PRODUCTS

(Begins on page 132)

from stock, can be supplied in both 13 to 1 and 20 to 1 ratios for requirements through 42 hp. These new drives feature helical gears cut from alloy-steel forgings. Both ball and tapered roller bearings are used where they best serve their purpose. Also featured is a three-wall, internally-ribbed housing providing permenent gear alignment, an extra large reservoir, as well as a concentric-shaft design. The units can also be supplied with a torque-arm overload release which protects the driven machine, motor and drive, in those operations where jam, choke or shock loads may occur. The American Pulley Co.

47—INDUSTRIAL TRACTOR is electric, stand-up model

Latest addition to this manufacturer's line of electric industrial trucks is the Model SX-24 Tractor Ox. Its operator stands in a space at the rear of the unit—an arrangement preferred by many for rapid mounting and dismounting. This battery powered tractor has 200 lb rated drawbar pull at 3¼ mph; a speed of 6¼ mph with no load and 3¼ mph with 10,000 lb rolling load. Forward and reverse push button controls and dual trigger hand operated brake controls for either-hand operation are on the steering handle. Automatic speed acceleration is provided: four speeds forward, three reverse.

The Model SX has over 180 deg of turn, 90 deg in each direction. Its close coupled wheel base and compact length permit turning in 39-in. intersecting aisles —wider aisles, of course, being necessary for trailer trains. Barrett-Cravens Co.

To receive product data circle item number on the handy Reader Service Cards provided on pages 205-206.

48—FLOCCULATOR for water treatment plants

The Spirol-Mix Flocculator is designed for vertical mounting in the flocculation basin. Water entering at the bottom is gently roll-mixed as it passes upward through the basin to the outlet at the top. According to manufacturer, the Spirol-Mix: eliminates short-circuiting of flow which wastes chemicals and lengthens settling time; provides a decreasing rate of agitation as floc forms while rising in the basin, thus preventing a break-up of floc already formed; and produces a uniform roll-mix action in the same direction as the water flow.

The unit consists of a variable-speed drive mechanism mounted on top of the basin and connected by a flexible coupling to a paddle-type mixer assembly within the basin. The mixer assembly consists of a vertical drive shaft to which

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Schrader Air Cylinders pack a power punch that can't be beat. Ideally suited to pushing . . . pulling . . . lifting . . . lowering — wherever straight-line repetitive operations are required — Schrader Cylinders are used in innumerable applications in industries of all types.

Schrader has a *complete line* of cylinders that will meet any requirement. They are available in single or double acting in any type of mounting and in any stroke.

Schrader Cylinders will produce a power stroke that cannot be equalled manually. And — don't forget — the complete Schrader Line includes operating and control valves of every type, as well as all other compressed air accessories, from air line to air tool. Write today for full details. The coupon below is for your convenience.

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Company _____

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Introducing **R-W "460"**

Continuous Power Chain Conveyor

A completely packaged conveyor for light loads

Now ZIG-ZAG® has a little brother! In response to many requests and exhaustive experimental engineering, Richards-Wilcox has developed a continuous power chain conveyor especially adapted to the handling of light loads. R-W "460" combines all the best features of Zig-Zag . . . flexibility, versatility and safety . . . plus special economies due to lower load limits. Engineering needs are at a minimum and structural requirements for use are substantially lower.

R-W "460" is available up to 200 ft. maximum lengths *only*, with capacities of 8½ lbs. on 6-inch centers or 17 lbs. per lineal foot, and 200 lbs. draw-bar pull. It is highly recommended as a supplementary conveyor unit in production lines and to help solve handling problems where the use of drying ovens, washers, paint sprayers, de-greasers and similar operations are involved.

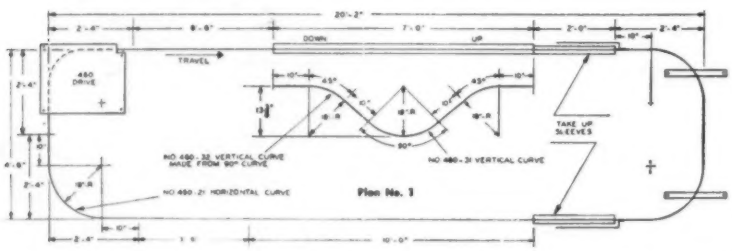

Diagram shows one of many different layouts possible with R-W "460" basic package. Up to maximum over-all length of 200 feet, variations are almost unlimited.

"460" Conveyors are shipped completely packaged from stock throughout the U. S. Packaging of R-W "460" Continuous Power Chain Conveyors is in convenient, easily-handled units. Orders to fill any requirement up to 200-foot maximum length are readily filled from stock. *For complete information and descriptive catalog contact:*

Richards-Wilcox Mfg. Co.
MATERIALS HANDLING DIVISION
3330 W. THIRD STREET, AURORA, ILLINOIS

1880 1954

SLIDING DOOR HANGERS & TRACK • FIRE DOORS & FIXTURES • GARAGE DOORS & EQUIPMENT • INDUSTRIAL CONVEYORS & CRANES • SCHOOL WARDROBES & PARTITIONS

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NEW PRODUCTS

(Begins on page 132)

blade support arms are attached. Load and thrust of the assembly is taken up by thrust bearings in the drive mechanism, and the drive shaft is held in place at the bottom of the basin by a pressure, water-lubricated guide bearing.

The pitch of each set of diagonal blades is increased toward the central axis to create a propeller-like action and provide a uniform multi-swirling motion. The step arrangement of each set of blades results in a decrease in total blade area from bottom to top of basin—as the water rises it is subjected to a decreased agitation rate to prevent floc destruction. Graver Water Conditioning Co.

49—PIPE STRAINERS, Y-type, come in eight sizes

Features designed to minimize maintenance are incorporated in this line of cast semi-steel Y-type pipe strainers. They are intended for use in steam, air, water, oil and gas lines at pressures to 250 lb. There are eight sizes from ¼ through 2 in. Straight bushing threads,

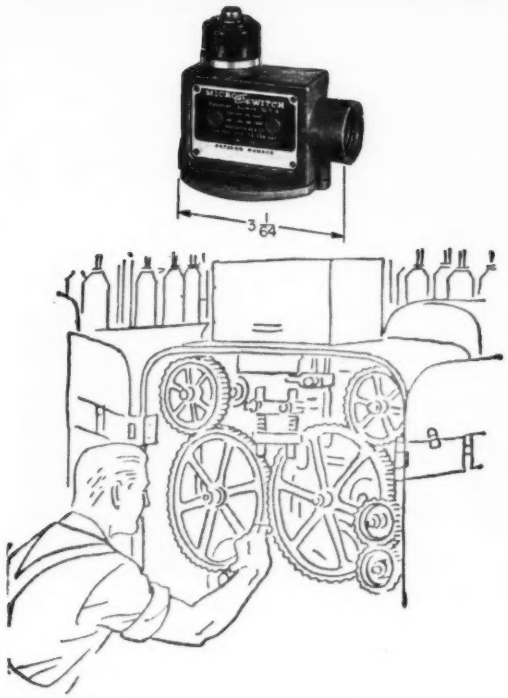
instead of pipe threads, ease removal of bushing and screen, it is pointed out; and a copper-asbestos gasket is positioned between base of bushing and the body to avoid possibility of gasket blowout. Only a light torque is required for a leak-tight seal, says manufacturer. Type 430 stainless steel corrosion-resistant screens are standard — either perforated 225 holes per sq in., or 20-by-100 mesh wire cloth. Screens can be of other materials. Armstrong Machine Works.

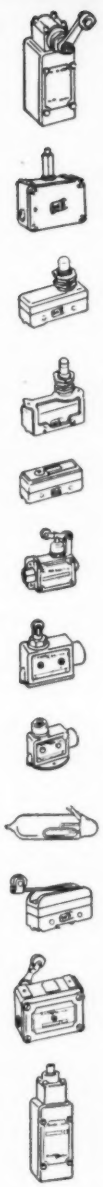
50—STEAM GENERATORS are versatile package units

Packaged Type MH Water Tube Steam Generators can be fitted with components to meet a broad range of individualized needs for power, process or space heating. With capacities of standard units ranging from 10,000 to 40,000 lb of steam per hour and pressures of 250 psi, even special requirements can be handled, manufacturer points out. Superheaters, of the pendant or drainable type, with or without control, can be installed to meet total temperature needs. Furnished for pressurized oil or gas firing, or both, and with

MICRO SWITCH Precision Switches
A PRINCIPLE OF GOOD DESIGN

Mills find profits in MICRO SWITCH protection for men and machines





THREAD BREAKAGE on a knitting machine can be expensive. Unless the machine is stopped at once it can mean breakage of costly needle beds.

R. E. Miller, plant superintendent of the E-Z Mills at Carterville, Ga., figures two of these MICRO SWITCH precision switches are saving him $50 a year per knitting machine. He installs them to replace stop motions and mechanical stops that often failed when thread breakage occurred.

Like Mr. Miller, hundreds of plant operators are saving important money by the use of these MICRO SWITCH products to make equipment more automatic, safer and more productive.

Purchase these switches from the MICRO SWITCH distributor in your town. For technical information contact the field engineer at your nearest MICRO SWITCH branch office.

PLUGGING of danger sources—both for operators and machines—with MICRO SWITCH precision switches is common practice of progressive plant operators.

This employee can't get his fingers caught in the gears. The MICRO SWITCH precision switch turns off the power when he opens the door.

But safety is only one way MICRO SWITCH products contribute to more production from present machinery. Used as limits and interlocks, they make all kinds of machines more automatic and efficient. Stocks of switches are available at the MICRO SWITCH distributor near you. Look in the yellow pages of your phone book.

MICRO SWITCH provides a complete line of extremely reliable, small-size, high-capacity, snap-action precision switches and mercury switches. Available in a wide variety of sizes, shapes, weights, actuators and electrical characteristics. For all types of electrical controls.

MICRO SWITCH
A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
FREEPORT, ILLINOIS

HONEYWELL

For more facts circle 599 on Reply Card

COTTON TOWELS* are used at New York's new Airlines Terminal

*Fairfax cotton toweling used by the East Side Airlines Terminal is supplied by Cascade Linen Supply Corp. of New York.

● The new streamlined East Side Airlines Terminal consolidates under one roof all airport coach departures and arrivals for 21 major U. S. and foreign airlines serving the New York area. Designed to save the vital time of airline travelers, every comfort and convenience has been provided for its daily traffic flow of 18,000 people. Naturally, this includes the extra comfort afforded by soft, absorbent cotton towels in the modern rest rooms.

Whatever *your* towel problem . . . whether you operate a factory, institution or office . . . you can be sure cotton towels will . . .

- *improve employee relations and promote customer goodwill*
- *cut maintenance costs . . . reduce fire hazard*
- *keep washrooms cleaner and tidier*
- *increase cleanliness and sanitation among your employees*

Here's How Linen Supply Works . . .

You buy nothing . . . your linen supply dealer supplies everything. The low cost includes cabinets, pickup and delivery, provides automatic supply of freshly laundered towels and uniforms. Quantities can be increased or decreased on short notice. Local service is listed in your classified book under LINEN SUPPLY or TOWEL SUPPLY.

Clean Cotton Towels . . .

Sure Sign of Good Management

Fairfax Towels

A PRODUCT OF WEST POINT MANUFACTURING CO.

WELLINGTON SEARS CO., SELLING AGENTS, 65 WORTH STREET, NEW YORK 13

For more facts circle 600 on Reply Card

NEW PRODUCTS

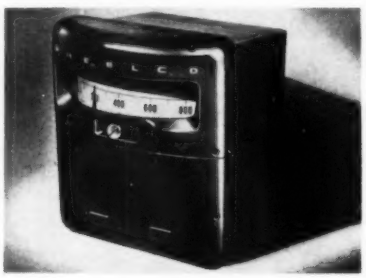
(Begins on page 132)

automatic, semi-automatic or manual combustion controls, this unit is also adaptable to stoker conversion. Air heaters and economizers can be supplied when required. Bulletin MH 3-54 gives details. Union Iron Works.

51—CONTROLLER is self-contained, electronic unit

Available in many control forms, the 400 Series Capacitrol is described as a self-contained, direct deflection, indicating controller adaptable to many process applications — heat treating furnaces, ovens and kilns, and machinery for extruding and molding plastics and nonferrous metals. It can also be used for such applications as indicating and controlling voltages, current, speed and similar variables in process industries.

As explained by manufacturer, the new instrument operates on an electronic control principle, in which a vigilant,



precise control circuit is constantly sensing changes in the measured variable. A two-comparment die-cast aluminum case, for surface or flush mounting, houses the components. The upper section contains a plug-in control chassis. Both of the molded plastic cover sections are gasketed for protection against dust and moisture, and the full-view window is contoured to eliminate reflection and glare. Bulletin F 6314 and Educational Bulletin 9 show control forms. Wheelco Instruments Div., Barber-Colman Co.

52—FORK-LIFT can be mounted from either side

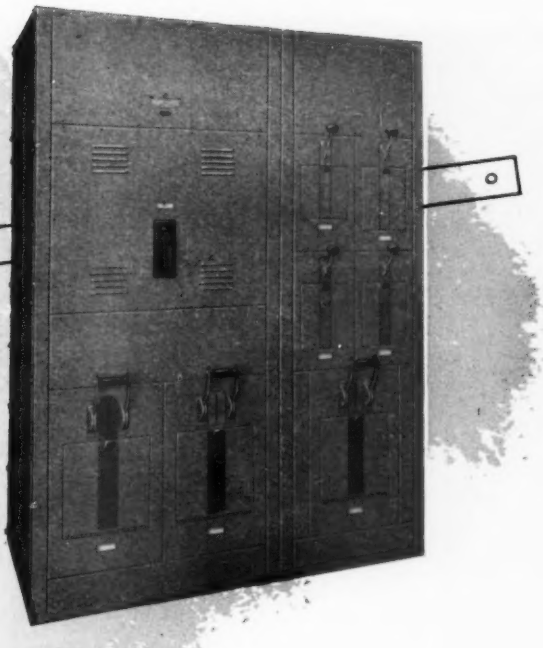
With a capacity of 3000 lb at 24-in load center, the new Model M-324 is a fork lift truck designed so the operator can get on or off from either left or right side. It incorporates manufacturer's Mobil-Matic Drive—a heavy-duty, oil-immersed multiple disc clutch, constant mesh transmission and fluid coupling. According to company, this drive transmits power smoothly from engine to drive wheels with maximum efficiency and minimum wear on the engine, clutch and other components. There is no clutch pedal, just a push-pull forward-reverse lever, accelerator and brake pedal. The truck has two speeds forward and two reverse.

Another feature is the Hydra-Lizer,

include a FA TRADE MARK standardized

SWITCHBOARD

in your modernization or new building plans



Efficiency, safety, dependability, long-lasting and trouble-free service are cardinal virtues of standardized Ⓕ switchboards.

The reason is that they embody all the latest features in design and operation.

Approved by the Underwriters' Laboratories, Inc., for label service, standardized Ⓕ switchboards are built of standardized pre-assembled units, incorporated in standardized enclosures.

All switchboards are factory assembled and shipped ready for connection to main and branch circuit cables. Sections are so designed that they can be used singly or grouped. Removable end walls permit the addition of sections on either side.

If you want to add to the efficiency, safety and economy of plant operations, then be sure to include a standardized Ⓕ switchboard in your modernization or new plant plans.

See your nearest Ⓕ representative listed in Sweet's industrial construction or plant engineering files for additional information.

THREE TYPES FROM WHICH TO CHOOSE

Ⓕ shutlbrak

a safety type switchboard designed for frequent and heavy use.

CAPACITIES:

30 to 1200 amps., 250 volts AC or DC and 600 volts AC 2, 3 and 4 poles. Rotary type operating handles furnished on 30-200 amp. capacities. Straight handles on all others.

Ⓕ klampswitchfuz and snufarc

a combination disconnect switch and fuse device.

CAPACITIES:

Ⓕ Klampswitchfuz, 30 to 600 amps., 250 volts AC or DC, 2, 3 and 4 poles, single or double throw.

Ⓕ Snufarc, 30 to 200 amps., 600 volts AC 2, 3 and 4 poles.

Ⓕ circuit breaker

a safety type switchboard with thermal-magnetic type circuit breakers.

CAPACITIES:

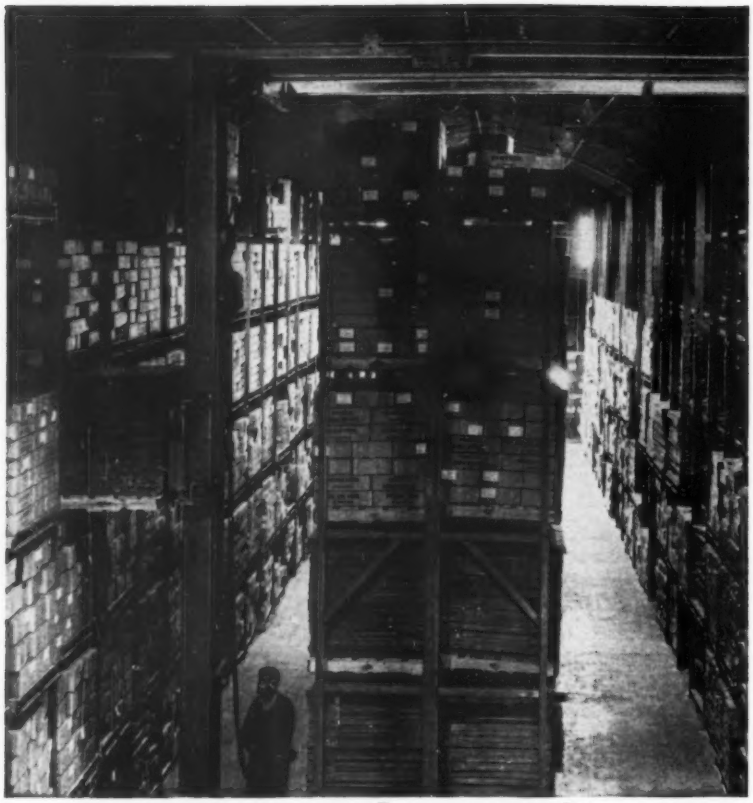
15 to 600 amps., 250 volts AC or DC and 600 volts AC, 2 and 3 poles. (Air circuit breakers are used for larger capacities.)

Frank Adam Electric Co.

BOX 357, MAIN P. O. • ST. LOUIS 3, MO.

makers of:
busduct • panelboards • switchboards
service equipment • safety switches
load centers • Quikheter

For more facts circle 601 on Reply Card



Oneida Ltd.

- stores 40" x 48" pallets 23 ft. high—within inches of the top of the trusses—
- has 100% selectivity in placement and removal with 1-man pendant push-button control.

CHICAGO TRAMRAIL TRAK-RAK STORAGE SYSTEM

secured these space-saving, time-saving advantages for Oneida Ltd. with a 3,000 lb. capacity self-contained TRAK-RAK crane operating as a top-running crane on rails mounted directly on top of the racks.

Material is delivered to either end of a storage hut by fork truck or other means. The TRAK-RAK then places it in preselected racks on either side of the aisle and stacks the material up to a height of 23 ft. which is considerably higher than by any other means.

The Oneida Ltd. installation in the storage hut did not permit any overhead handling equipment without additional structural steel to support the crane, and the TRAK-RAK Storage System was made without any alterations to the building whatsoever.

Like all TRAK-RAK installations, the crane permits movement in eight directions —up, down, to both sides; and rotates a full 360° clockwise and counter-clockwise to serve both aisles. The system can be installed in practically any type of storage building and can be furnished as a self-contained unit running on top of the racks or as an underrunning crane system where interlocking transfer can be furnished when desired. Unit can also be supplied with automatic prepositioning devices, with telescoping column, with cab for operator to ride with the load, and with many other features as may be required by the application.

TRAK-RAK Applications is a new 20-page illustrated booklet showing representative operating installations with many different types of materials in many diverse industries. It will be sent to you upon request without obligation. **Write for it today!**

CHICAGO TRAMRAIL CORPORATION

4000 West Washington Boulevard • CHICAGO 24, ILLINOIS

For more facts circle 602 on Reply Card

NEW PRODUCTS

(Begins on page 132)

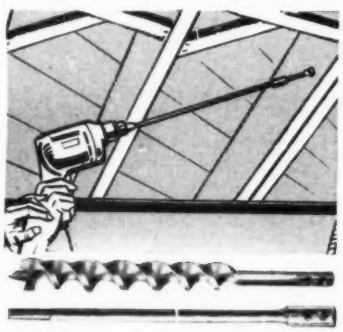
which consists of equalizers mounted on each rear wheel and connected hydraulically to cross compensate the truck when front or rear wheels pass over bumps. The truck is powered by a Hercules four-cylinder gas engine, has hydraulic service brakes and hand operated parking brake. Its wheelbase is 42 in.; length, less forks, is 72⅞ in., and turning radius, 72 in. Lamson Mobilift Corp.

53—FILTERS for the non-flammable hydraulic fluids

All models of this company's sump and line type synclinal filters have been adapted for use in the filtration of all types non-flammable hydraulic fluids. No changes have been made in the basic design which provides balance between maximum active filtering area and sufficient storage capacity for filtered out particles. They are available for either sump or line installation in capacities from 5 to 100 gpm (greater capacities attained by multiple installation). Both types may be disassembled, cleaned and reassembled in a few minutes, according to the manufacturer. The line type operates in any position and may be serviced without disturbing pipe connections. Marvel Engineering Co.

54—POWER BIT and companion bit extension tool

The Russell Jennings 104 Power Bit is heat treated the entire length for work-horse strength, it is announced. A heavy-duty fast-boring bit said to have exceptional pulling power on tough jobs, it features hand-sharpened lip and spur, plus a sharp single thread that draws the bit easily through soft or hard wood.



Three machined flats are provided on the shank to eliminate slipping. The bit fits a three-jaw electric drill chuck ⅜ in. or larger.

Two set screws on the shank line up with hex socket screws in the chuck of the companion Power Bit Extension 184 —to keep the bit from turning in the extension and prevent loss of bit when pulled from the hole. The combination of this fast-boring bit and extension is said to practically walk through a line of joists, beams and studding. The bit

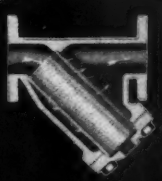
KING SIZE

Here's McAlear King Size Style 528 Strainer for hydraulic service . . . body, cast steel . . . 1200 lbs. working pressure . . . baskets, stainless steel . . . size, 24" . . . weight, 10,000 lbs.

medium

or

small

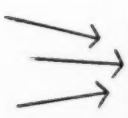


Style 530—flanged ends
Cast Iron: 1¼" to 10" inclusive
Cast Steel: 1½" to 10" inclusive

Style M530—Screwed Ends With Mesh Basket
¼" to 4" sizes

McALEAR STRAINERS meet the needs of all

When piping plans call for strainers, look to McAlear. Here's a line with the widest range ever . . . sizes from ½" to 24". All types, too . . . flanged or screwed bodies . . . clamped or bolted covers . . . bodies of steel or special alloys and baskets of stainless steel, brass or monel . . . pressure ratings for all services. McAlear Strainers supply positive protection against grit and scale . . . cut pipe line repair costs . . . insure efficient operation.



IF IT'S McALEAR EQUIPPED IT'S UNDER SAFE CONTROL

McALEAR controls
PRESSURE · FLOW · LIQUID LEVEL · TEMPERATURE
for STEAM, WATER, AIR, OIL-GAS

McALEAR MANUFACTURING COMPANY
1901-1919 South Western Avenue
Chicago 8, Illinois

For more facts circle 603 on Reply Card

New . . . Different . . . Better

COFFING

Super Power

COIL CHAIN

RATCHET LEVER HOIST

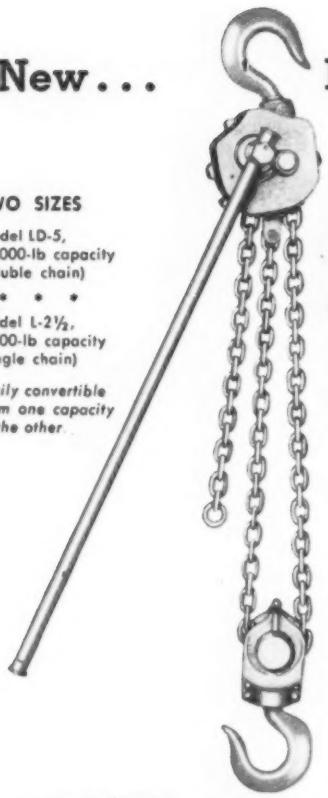
TWO SIZES

Model LD-5,
10,000-lb capacity
(double chain)

* * *

Model L-2½,
5,000-lb capacity
(single chain)

Easily convertible from one capacity to the other.



For over two years the entire production of Coffing's new Super Power Ratchet Lever Hoist has gone into military service. Now it is available to bring new standards of ratchet hoist performance to civilian users. These are just a few of the advantages this new hoist offers:

SIMPLE in design

Parts are simple, rugged and few in number to assure continued top performance. May be disassembled in the field for fast, efficient servicing.

The only 5-ton hoist of this type using but two chains, contributing to faster operation and lighter weight.

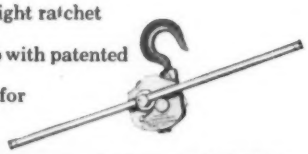
CONVENIENT to use

Handle adjustable for close-quarter applications — also may be operated from opposite side of hoist.

The 5-ton model weighs but 58 lb — lightest weight ratchet hoist in this capacity on the market.

Only 70 lb of handle pull needed to lift 10,000 lb with patented compound lever principle.

You get coil chain flexibility plus free chaining for quick adjustment.



TOUGH for safety and dependability

Ratchets and pawls are specially hardened alloy steel — *every* load-holding ratchet is tested at 30,000 lb.

Housing is certified malleable iron to protect hoist from rust and damage.

Handle is designed to bend before hoist is overloaded beyond safe limits.

For full details, write for Bulletin PL10L.

IN PUNISHING "DROP TEST," the Super Power had to withstand the shock of a 10,000-lb load dropped 4 in.— *an impact load of over* 40,000 *lb.* After several hundred such tests of Super Powers, there has never been a hoist failure!

COFFING HOIST COMPANY • DANVILLE, ILLINOIS

Originators of the Ratchet Lever Hoist

QUIK-LIFT ELECTRIC HOISTS • HOIST-ALLS • MIGHTY-MIDGET PULLERS • SPUR-GEAR HOISTS
DIFFERENTIAL CHAIN HOISTS • LOAD BINDERS • I-BEAM TROLLEYS

For more facts circle 604 on Reply Card

NEW PRODUCTS

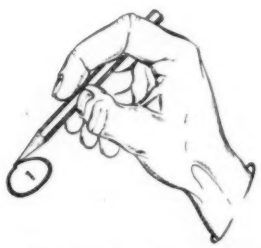
(Begins on page 132)

comes in five sizes 11, 12, 13, 14, and 16 sixteenths. The steel extension follows $\frac{11}{16}$ and larger bits, fits $\frac{3}{8}$-in. and larger chuck holes. It comes in 18- and 24-in. lengths. Stanley Tools.

55—WEIGHT CONTROL for continuous blending

For continuously blending additives with process material, this weight control system covers the batch weighing of additives, continuous weighing of process material and remote selection of weight ratios using a single dial control. Advantages cited are rigid process control, immediate start-up, quick formula changing, precise weighing of additives and operation over a wide range of weight ratios. Products handled include chemicals, foods, feeds, plastics, cement and rock products, others.

Components of the system are an automatic hopper scale, electric control system, control panel and constant-weight belt feeder. In operation, process material drops on a belt feeder and discharges into a mixer. Batches of additive material are weighed out and automatically discharged into the same mixer. Signal for the discharge of additives is transmitted via an impulser on the belt feeder. Thus, the flow of material leaving the belt feeder determines the rate of discharge of the additive material. Richardson Scale Co.

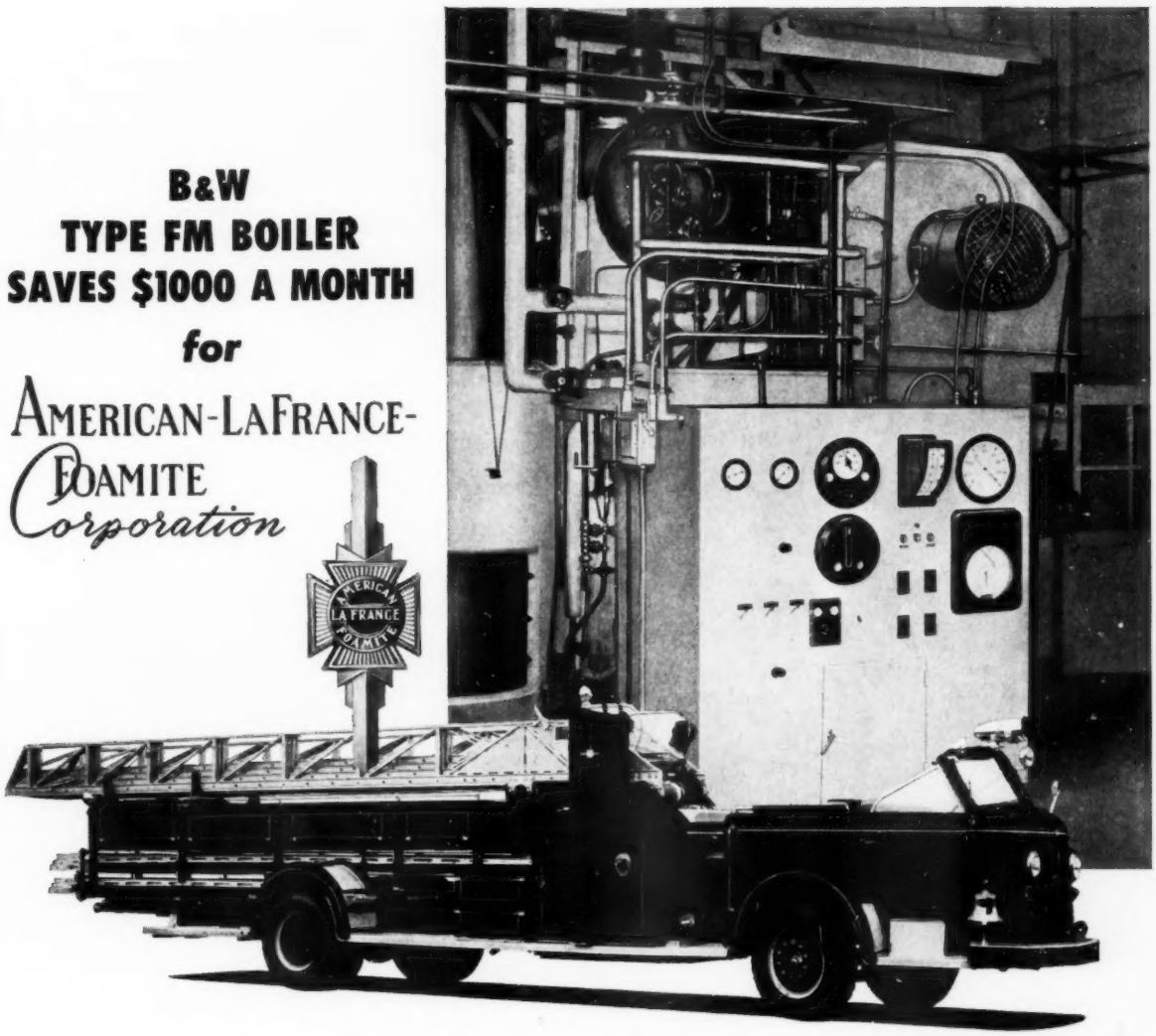


Use the Reader Service Cards provided on pages 205-206 to ask for more information on these products. Circle item numbers of products in which you are interested.

56—PLUG VALVE for working pressure to 300 psi

An improved plug type valve for pneumatic applications, fluid transmission systems, and instrumentation uses, this new model features a pressure balanced plug and has brackets for mounting. Its internal construction includes a pressure passage which maintains constant line pressure on the top of the plug to eliminate possibility of plug lifting. A floating stem, sealed against leakage by an O-ring,

B&W TYPE FM BOILER SAVES $1000 A MONTH for AMERICAN-LAFRANCE-FOAMITE Corporation



One of the world's largest manufacturers of fire-fighting equipment has reduced its fuel and operating costs at the rate of $12,000 per year by installing a B&W Integral-Furnace, Type FM, and making other related plant improvements. It is estimated that in 6 years this B&W steam generator will pay for itself.

Tied in with the plant's existing high-pressure steam system, it will produce 8,000 lb of steam per hour in heavy-load periods and will operate alone to furnish power for low-load periods. The biggest single saving effected by this installation is fuel. Formerly a large portion of the fuel burned during the summer, averaging about 50 tons per week, was used for banking and actually served no useful purpose. The automatic oil or gas-firing feature of the FM Boiler eliminates banking. Further, the unit's compact design and completely automatic features, including the flame-failure detection device, releases operating and maintenance personnel for other duties.

The completely shop assembled, FM Boiler is virtually on the line upon arrival—needing only hooking up of service connections before it goes to work. This widely-used B&W unit is suitable for a wide range of industrial, commercial, institutional, and other classifications. It is available in standard sizes for loads ranging to 36000 lb of steam per hour, at pressures to 235 psi. It is available for higher pressures. FM units in service, and on order represent a steam output of over 9,000,000 lb per hour and considerable savings in fuel and operating costs that are well worth serious consideration.

COST-SAVING FEATURES of the B&W Type FM Boiler

- Saves Erection Time and Cost
- Meets Wide Range of Service
- Handles Quick Load Changes
- Fast Steaming
- Low Maintenance
- Easy Accessibility
- Suitable for Outdoor Service
- Burns Oil and/or Gas
- Saves Fuel
- Saves Space
- Safe, Automatic Operation

BABCOCK & WILCOX

BOILER DIVISION G-638

For more facts circle 605 on Reply Card

DO YOU USE OR MAKE ANY OF THE PRODUCTS IN THIS LISTING?

List of Users

The types of industries listed are all repeat users of **Tru-Lay Push-Pull Controls.** Experimental applications are not shown.

Agricultural Equipment
Air Conditioning Equipment
Aircraft & Parts Automobiles
Bakery Equipment Boats & Ships
Bottling Machinery
Brewing & Distilling Equipment
Business Machines
Buses & Motor Trucks
Candy Making Machinery
Canning Machinery
Ceramics Machinery
Chemical Processing Machinery
Coal Mining Machinery
Coin Operated Machines
Construction Machinery
Dairy Products Machinery
Dental & Surgical Equipment
Die Casting Machinery Diesel Engines
Drinking Water Coolers
Electrical Appliances
Electrical Generating Equipment
Electrical Machinery
Electrical Transmitting Equipment
Electronic Equipment
Elevator Control Panels
Fire Protection Equipment
Food Processing Equipment
Forging Machinery
Foundry Equipment
Gas & Oil Production (Test Stands)
Glass Making Machinery
Grain Processing Equipment
Hat Machinery Heating Equipment
Hydraulic & Pneumatic Equipment
Ice Cream Making Machinery
Laundry & Dry Cleaning Equipment
Leather Working Machinery
Lumber & Saw Mill Machinery
Marine Equipment
Materials Handling Equipment
Metal Mining Machinery
Metal Working Machinery – Machine Tools
Military & Naval Equipment
Motorcycles & Bicycles
Nuclear Science Equipment
Oil Refinery Equipment Ordnance
Packaging Machinery
Paint Making Machinery
Paper Making Machinery
Photo Equipment (manufacture)
Plastics Fabricating Machinery
Plastics Producing Machinery
Power Plant Equipment
Printing & Binding Machinery
Quarrying Machinery
Radio & Television (manufacture)
Railroad Equipment
Road Building & Maintenance Equipment
Rubber Processing Equipment
Safety Locks on Fuse Panels
Sanitation Plumbing (Floor Valves)
Shoe Machinery Steel Mill Machinery
Telephone & Telegraph Machinery
Textile Machinery
Waterworks Equipment
Welding Equipment
Wire Making Machinery
Woodworking Equipment
X-Ray Machines

Whether your interest is in a single application of this versatile

PUSH-PULL CONTROL

or in its inclusion as a component of the product you manufacture, we would welcome your request for our **DATA FILE** for your further study.

Because **TRU-LAY PUSH-PULL CONTROLS** are "SOLID as a rod but *FLEXIBLE* as a wire rope" their use has simplified the design and improved the operation of literally hundreds of products as indicated in the accompanying list of repeat users.

These fine controls are designed, and painstakingly built, to have the qualities of **ACCURACY, HIGH LOAD CAPACITY, FREEDOM FROM TROUBLE, LONG LIFE, FLEXIBILITY** . . . they are frequently and successfully used in conjunction with electrical, hydraulic and air controls . . . they are thoroughly effective under almost any operating condition.

Here are some of the jobs they handle well . . . **HOT** jobs on jets and industrial furnaces . . . **COLD** jobs down to –70°F. . . . **WET** jobs in food processing and marine applications . . . **DIRTY** jobs in cement mills and coal mines . . . **CORROSIVE** jobs in chemical processing . . . **HEAVY, TOUGH** jobs on construction machinery . . . **LIGHT DUTY** jobs on business machines, drinking water coolers . . . **REMOTE** jobs 150 feet or more from control point . . . they **DAMPEN VIBRATION** to protect delicate instruments . . . and **LUBRICATION** of the inner, working member is taken care of *for life* during assembly.

• The six booklets and bulletins in this **DATA FILE** will answer further questions you may have about this versatile and dependable tool, and will also provide you with the means of defining to us the application you may be interested in.

PUSH PULL

Write for a copy without obligation

DATA FILE

ACCO

AUTOMOTIVE and AIRCRAFT DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

601 Stephenson Bldg., Detroit 2
2216 South Garfield Ave., Los Angeles 22 • Bridgeport 2, Conn.

For more facts circle 606 on Reply Card

NEW PRODUCTS

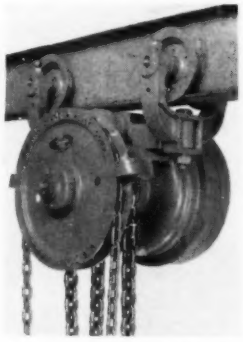
(Begins on page 132)

promotes alignment of plug in body. Another feature announced is a retaining shoulder on the stem to prevent lifting.

The plug is made of a nickel silver alloy. Two styles are offered: male to female, and male to male pipe thread, in sizes of ⅛, ¼ and ⅜ in. Dryseal threads are provided on pipe connections. Bulletin 3024 describes the valves. The Imperial Brass Mfg. Co.

57—CHAIN HOIST and trolley for close headroom use

For operation in limited headroom and for short radius curves, this combined lowhead hoist and trolley consists of company's standard multiple gear chain hoist



attached to a special load bar on swivel type trolleys. Cast steel trucks with ball bearing wheels running on hardened steel axles contribute to the durability of the unit. It is available in 1-, 1½-, and 2-ton capacities. Reading Crane & Hoist Corp.

58—CONTROL CENTERS feature compact design

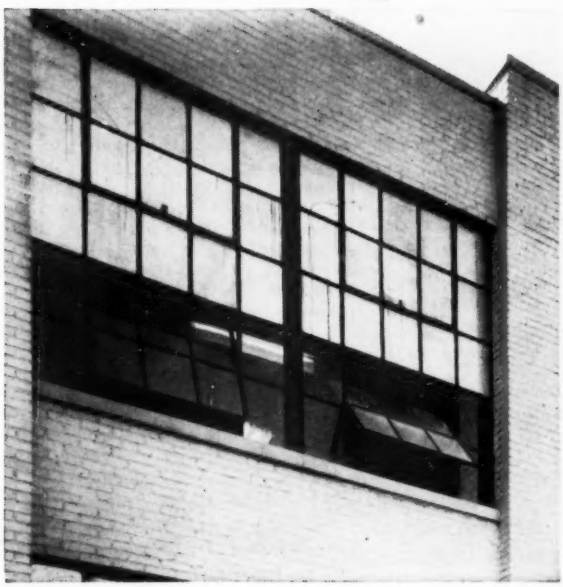
Motor Control Center DA7093 is said to save up to 50 per cent in floor space. It will take nine NEMA Size 1 starter units, or six NEMA Size 2 units in the standard 90-in. trough without reduction in pull-box space. Starter units will be either fusible or circuit breaker types. Other design features incorporated include a center busing arrangement that frees pull-box space for wiring and increases vertical bus capacity from 300 to 600 amp. This same arrangement also makes available continuous main buses of 600 of 1200 amp capacity in standard construction up through five sections. The trough is designed to take straight-in wiring to main lugs.

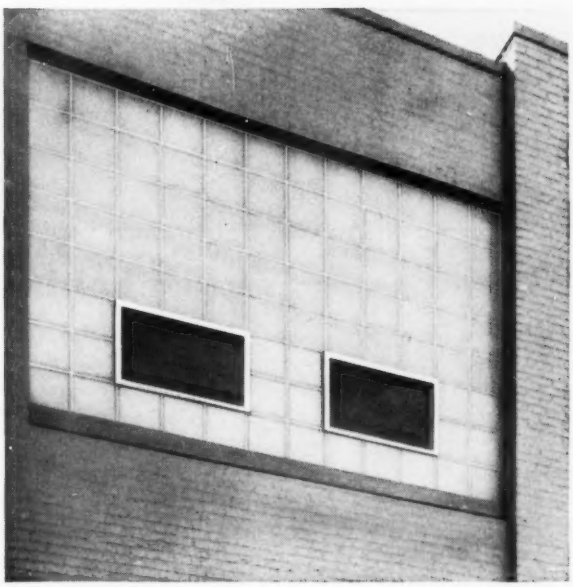
A separate insulator is furnished for each bus. Main buses are mounted in an edge-to-edge arrangement and vertical bus bars are spaced on 5-in. centers—both of these innovations are said to afford increased short circuit capacity. Also incorporated in this control center are split Type B terminal blocks which allow started units to be removed or inserted without disturbing wiring.

As a safety feature, cadmium-plated

Bayer cut maintenance costs 90%... when they changed

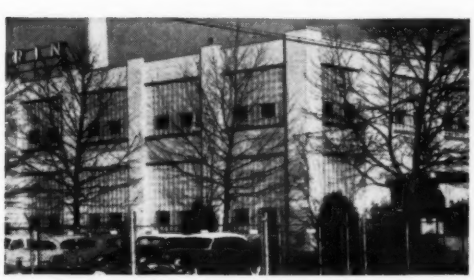
from this to this





● The office building at Bayer Division, Sterling Drug Company, Trenton, N. J. was originally built with steel sash in its window areas. The maintenance crew periodically had to clean and paint the sash. And in winter, heat loss was high, resulting in excessive heating costs.

Then Bayer Aspirin modernized the windows with functional PC Glass Blocks. Since these blocks filter and diffuse daylight, venetian blinds, shades or louvres are rarely needed – reducing an important cost factor. As a matter of fact, Bayer figured that PC Glass Blocks cost less than *any* other construction in terms of first cost, maintenance, and reduced heating bills. Not only did Bayer cut window maintenance costs 90%, but heating costs dropped 20% due to the high insulating efficiency of the blocks.



To sum it up Bayer says, "Our offices are cleaner, more comfortable, and better looking. We are delighted with the finished job."

You can get these same results when modernizing an old structure or building a new one. Write for more information to Pittsburgh Corning Corporation, Dept. PG-104, One Gateway Center, Pittsburgh 22, Pennsylvania.

PC Glass Blocks

PITTSBURGH PC CORNING

ALSO SKYTROL* AND FOAMGLAS®

*T. M. Reg. Applied For

For more facts circle 607 on Reply Card

ENGINEERED BELTING...THE RIGHT BELT FOR EACH JOB

Do you need strong belting, too?

■ This remarkable Imperial Belt was installed in Chicago's Union Station as a mail bag conveyor in the summer of 1945. For nine years it has operated almost continuously—24 hours a day, seven days a week. The only exception is when power shut-offs or blockades occur. Such rare stoppages last only a few minutes. The belt that has turned in this tremendous service record is an Imperial Black Rexall, 36"x4-ply, 410 feet long. It is one of more than 20 Imperial Black Rexall conveyors in the Chicago Union Station—belts whose aggregate length is 6740 feet, or well over a mile.

Inner-locked construction—special impregnation

Imperial Black Rexall is chosen for jobs like these because of its great strength and toughness. Constructed of tightly-woven heavy-duty silver duck, it is double-stitched and inner-locked to prevent ply separation and is impregnated with a special compound that strengthens, lubricates and preserves the fibers. Black Rexall Belting is unexcelled for conveyors and elevators handling heavy or semi-abrasive materials.

Belting Job Designed for You

Whatever your belting need, there is a job-designed Imperial Belt to fill your requirements and cut your materials handling costs. Write for informative new Catalog 54-3.

Imperial
INNER-LOCKED
BELTING
First in stitched canvas belting for over 45 years

You expect more from Imperial and you get more!

IMPERIAL BELTING COMPANY

1759 S. Kilbourn Avenue
Chicago 23, Illinois

Write for new Catalog 54-3. It will help you cut belting costs.

For more facts circle 608 on Reply Card

NEW PRODUCTS

(Begins on page 132)

gliders, mounted on the underside of each unit, ground the unit to the cadmium-plated base upon which it rides; and this grounding occurs before the unit engages the bus bars. Each standard section measures 13½ in. deep by 24 in. wide. These sections can be installed back-to-back, with a combined depth of 27 in. The control center is made in NEMA-1 or 1A enclosures and NEMA Type A, B, and C construction is available. General Electric Co.

59—RUST REMOVER takes off rust, paint and primer

Rustgon, a non-acid rust removing material that strips paint, rust, and primer from ferrous metal surfaces is announced as requiring only two steps—a dip and a pressure rinse. Parts to be de-rusted and stripped are immersed into the Rustgon hot tank, withdrawn, and then rinsed with air-and water- or with steam. Ingredients formulated into Rustgon decrease the de-rusting tendency, it is said, and de-rusted metals are no more subject to rusting than new metal. Rustgon is described as an alkaline material having no corrosive fumes. It requires no electrolytic action.

According to manufacturer, Rustgon removes the heaviest rust, as well as stubborn paint deposits of red oxide, primer, baked lacquer, acid-proof paint and asphalt finishes. It is claimed to remove slightly pitted rust in less than a minute and removes even heavy and multiple coatings of paint in a few minutes' immersion. Turco Products, Inc.

60—TRANSMITTER for process instrumentation

Pneumatic telemetering and control systems may be simplified by the use of a new universal transmitting unit available for measurements of flow, level, pressure, temperature, draft, differential and vacuum. The measuring element actuates the transmitter's micro-sensitive vane, nozzle and booster assembly. Transmitted signals of 3-15 and 3-27 psig may actuate pneumatic receivers and/or controllers. Both measured variable and pneumatic signal are indicated on a common scale for easy checking.

The unit is about 8 by 10 by 3½ in. in size and its casing is said to be weather-, vibration-, and corrosion-resistant. Transmitting distances can be 1000 ft to receivers, 400 ft to controllers. Accuracy is given as within ±½ per cent of measured range span, and air consumption less than 0.15 cfm. Capacity is approximately 3 cfm with a drop of 1 psig from a signal of 15 psig. Bailey Meter Co.

61—SADDLE for safer "hot tapping" of piping

A full encirclement saddle for "hot tapping" petroleum piping is announced as providing the 360 deg reinforcement de-

It's Good Accounting Practice!

TO MEASURE GAS CONSUMED BY INDIVIDUAL FURNACES, KILNS, OVENS, ETC.

Good management goes hand in hand with good measurement. Good managers know that by metering individual gas furnaces, kilns, ovens, etc., they will have accurate figures upon which to base product costs. They know that metered records of gas consumption will quickly show-up combustion deficiencies that affect the quality of the end product. They know, too, that with a meter standing guard over every department and at the inlet to every set of burners, wasteful fuel practices are discouraged.

Why don't you investigate the advantages of in-plant metering? Write the nearest Rockwell district office or use the handy coupon.

ROCKWELL "800" GAS METER

Other Useful Rockwell Meters

ROCKWELL FLOW INDICATING METER

Measures rates of flow. Read directly from graduated scale in c.f.h. Time and money-saving production tools for manufacturers of gas appliances to use when setting, adjusting and testing flow rates.

ROCKWELL TEST METER

Fits the need for a gas meter with a large dial to be used in test or laboratory work. Ideal for visually demonstrating the consumption of gas appliances.

YOU CAN RELY ON ROCKWELL

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. Atlanta Boston Chicago Dallas Houston Kansas City, Mo. Los Angeles New York Philadelphia Pittsburgh San Francisco Seattle Tulsa

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USE THE HANDY COUPON

5441-PR

ROCKWELL MANUFACTURING COMPANY
PITTSBURGH 8, PA.

Gentlemen:

I am interested in your meters for measuring gas to individual furnaces ☐. Your flow indicating meters ☐. Your test meters ☐. Please send literature ☐. Have representative call ☐.

Your Name .....

Company .....

Street .....

City .....Zone.....State.....

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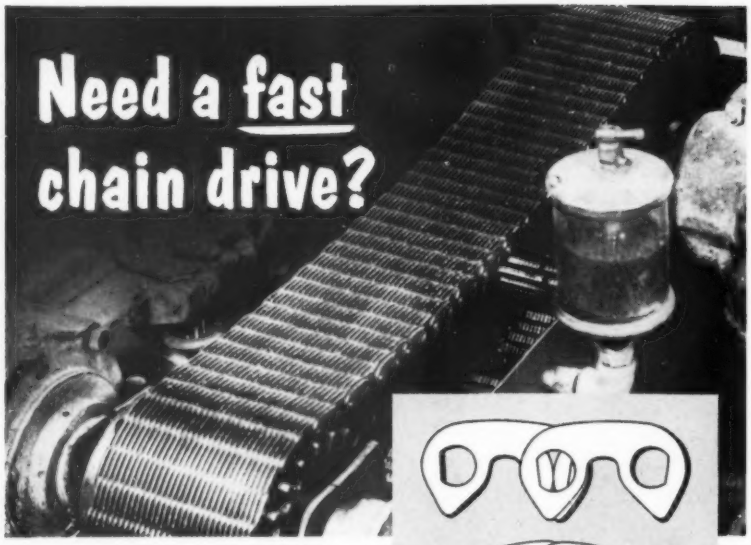


NO SLIDING NOR RUBBING of loaded bearing surfaces. Note how the two pins, each locked in their respective links, simply roll on each other as the chain flexes. That is why a Ramsey chain flows over a sprocket as smoothly as water over a dam.

5030 feet per minute is the running speed of this . . .

RAMSEY SILENT CHAIN DRIVE

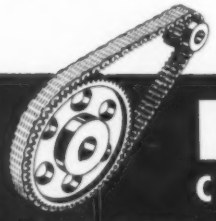
A chain drive that will keep cool and quiet at that speed, while delivering 75 hp continuously, must have exceptional anti-friction qualities. Especially when its lubrication is only a drip-feed from a single oil cup. The answer is in the unique Ramsey chain construction, with its friction-free roller bearing action at the joints.

Naturally, since friction is almost eliminated, you get extra long chain life, and freedom from maintenance problems.

Better power-transmission because the roller bearing joints take almost no toll of power. There is no other chain like the Ramsey.

HERE IS VITAL ENGINEERING DATA ON CHAIN DRIVES

The Ramsey Chain Catalog—60 pages of informative data on chain drives and their application, with full information needed to work out sizes, etc. for a specific drive. At your request—write today.



SILENT CHAIN DRIVES — FLEXIBLE COUPLINGS

RAMSEY CHAIN COMPANY, INC.

5150 BROADWAY • ALBANY, N. Y.

For more facts circle 610 on Reply Card

NEW PRODUCTS

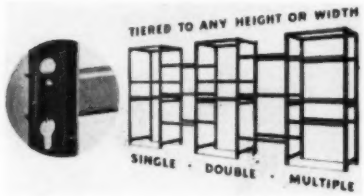
(Begins on page 132)

sirable when dealing with high pressures and large diameter pipe and taps. The saddle is designed for use with either high yield strength thin wall pipe, Grade B 35,000 or 42,000 yield strength pipe, and for use with heavy wall cylinders employed for use with suction and discharge headers, bottles and pulsation dampners in compressor stations. It is available in standard and special sizes through 42 in. and in all straight and standard reducing outlet sizes. It is made from rolled plate.

The saddle outlet is forged, and its inner diameter corresponds to the outer diameter of the branch outlet. The saddle is split longitudinally, on a horizontal plane, perpendicular to the axis of the outlet, thus eliminating welds in critical crotch area. When clamped to the pipe, the two halves of the saddle are joined to the bottom half of the saddle, only one field weld on each side being necessary in addition to the weld between saddle and branch outlets. Tube Turns.

62—STORAGE RACKS, adjustable, easy to assemble

Ease of assembly and dismantling is stressed for these storage racks. No bolting or welding is necessary to put them up—cross bars lock into slots on uprights (minimum of 4 in. apart) to



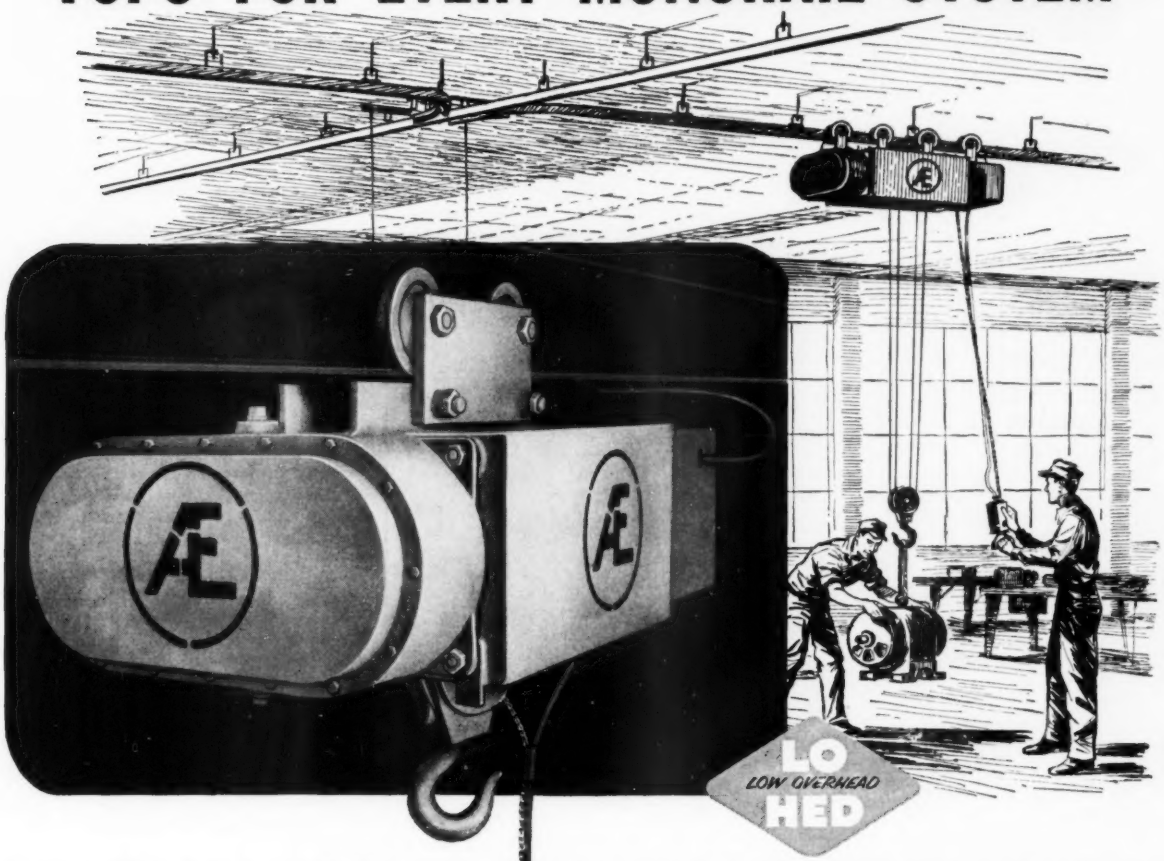
make the rack safe for storage of light or heavy materials. Rack space is adjustable to any height, at any time, by lifting and inserting cross-bars with male joiners into the slotted vertical uprights. Of all-welded steel construction, the racks are built to a plant engineer's specifications. Palmer-Shile Co.

63—BLACK PAINT protects against rust and corrosion

Rubalt RA combines chlorinated natural rubber and bitumen together with modifiers and solvents; it is described as a black corrosion resistant paint that looks like patent leather and has a rubbery feel. General characteristics announced for Rubalt RA are: non-porosity, flexibility, and maximum adhesion, also resistance to many acids and alkalies, to heat and to low temperatures. Company says it is waterproof, non-flowing under heat, and requires no primer or pre-treatment. Coverage is given as 756 sq ft per gallon at 0.001-in. thickness, or 378 sq ft per gallon at 0.002-in.

Among many uses for this protective coating is its application in the preven-

NEW CLASS BB LO-HED HOIST... TOPS FOR EVERY MONORAIL SYSTEM



IF YOUR HOISTING INSTALLATION employs a monorail system, American Engineering's new Class BB Lo-Hed Hoist is the best choice you can make today. This new heavy duty Lo-Hed, available in 2-ton and 3-ton capacities, is adaptable to every monorail system and brings you the advantages inherent in Lo-Hed's balanced design *plus* the latest in both materials and performance:

★ A welded steel chassis that combines strength and lightness;

★ Heat-treated spur gears. Three reductions in line provides full accessibility and utmost ease of maintenance;

★ Single speed pushbutton control with reversing magnetic contactor; puts only 110 volts at the pushbutton;

★ Load hook hangs on anti-friction thrust bearing;

★ Upper and lower limit switch.

Class BB Lo-Hed Hoist is made in four suspension types... lug (with lugs integral with chassis—for floor or overhead mounting); plain trolley; hand-geared trolley; motor trolley. Mail coupon for full information about the new Class BB Lo-Hed Hoist, or about other Lo-Hed Hoists available in capacities from 1/4 to 12 tons.

AMERICAN ENGINEERING
COMPANY
PHILADELPHIA 25, PENNA.

In Canada: Affiliated Engineering Corporations, Ltd., Montreal 2, P. Q.

AE Products are: Taylor and Perfect Spread Stokers, Marine Deck Auxiliaries, Hele-Shaw and Hydramite Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers.

American Engineering Company
2503 Aramingo Avenue, Philadelphia 25, Pa.

Gentlemen: Please send me literature about ☐ the new Class BB Lo-Hed Hoist or ☐ other Lo-Hed Hoists from 1/4 to 12 tons.

Name.....Title.....

Company.....

Address.....

City.....Zone.....State.....

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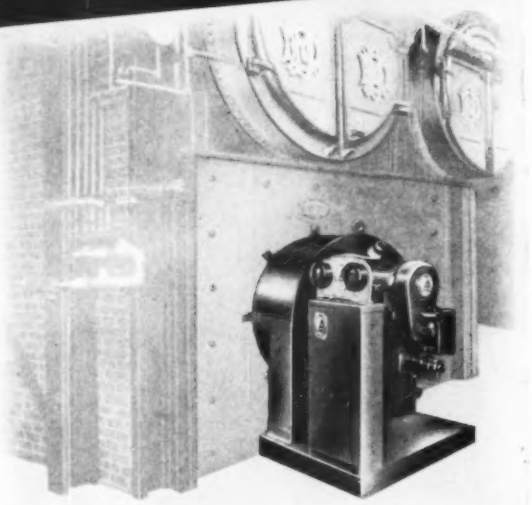
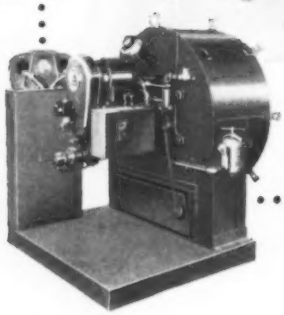
Here's Packaged Power for More Efficient Heating



for Standard Industrial and Commercial Boilers of 20 to 525 BHP



Field Surveyed
Custom Engineered
Factory Assembled and Tested
Complete with All Accessories
Burns Oil (#6 or lighter), Gas or in Combination
Fully Automatic

THERMOPAK

AUTOMATIC COMBUSTION SYSTEM

Saves on Installation Costs • Heats More Economically

The Preferred Thermopak is a completely integrated fuel-burning unit, with all necessary controls and accessories, which readily converts any standard fire- or water-tube boiler to fully automatic, efficient operation.

Installation requires only fuel piping and electrical wiring to the unit. It minimizes the difficulties of divided responsibility for engineering and installation, and achieves more definite control of performance.

The Preferred Thermopak Plan assures you of *single* responsibility for the complete system, thereby saving on installation time and labor, and assuring more dependable, economical operation. Bulletin 185 tells the Thermopak story. Get a copy.

PREFERRED UTILITIES MFG. CORP.

1860 BROADWAY DEPT. PL-5 NEW YORK 23, N. Y.

For more facts circle 612 on Reply Card

NEW PRODUCTS

(Begins on page 132)

tion of air washer corrosion in air conditioning equipment maintenance. According to manufacturer, the low oil content of Rubalt RA makes it non-oxidizing and non-saponifiable, so that exposure to the large amount of oxygen found in air handling and the alkali treated waters do not break it down. Detailed performance data and suggestions for use of paint are given in a folder. Alfred Hague & Co.

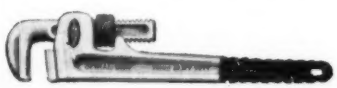
64—HEAVY CEMENT is easily applied, fast setting

Instant Setting Garonite is announced as a heavy, dense cement which dries without shrinking to a mass of great strength. It is ready for use, says company, and is easily and safely applied by adding water. It is grey in color and oil resistant. Applications for this extremely fast setting cement include anchorage for bolts, posts, handrails, partitions, and instrument panels; grouting of machinery; and repairing of concrete floors.

According to manufacturer, this cement permits use of light machinery or equipment within 30 min after application, and of even the heaviest of vibrating units within an hour. Floors may be opened to traffic at the same rate of time, depending on load. Garonite is reported to be three times as strong as concrete that is fully cured. It is intended for interior use in areas not subject to constant water. Garon Products Co.

65—PIPE WRENCH offers light weight, strength

Of aluminum and forged steel, the Spiral Grip Pipe Wrench is designed to combine the lightness of aluminum in the



handle-housing, with the strength of steel in the jaws. And the spiral grip handle serves to provide a firm hold. This heavy duty wrench is available in 10-, 14-, 18-, and 24-in. sizes. Trimont Mfg. Co.

66—UNIT HEATER is designed for easy servicing

This downblow unit heater has a die-formed full venturi and is so designed that the motor and fan can be removed from the bottom of the unit. Servicing of motor and fan assembly, if required, is relatively simple, manufacturer points out. The motor mountings are separated from the coil and heated air stream and are attached to rubber mountings in the bottom of the motor well. You simply loosen four bolts in order to drop the well, motor and fan from the unit, says company, but the design is such that there is no possibility of the assembly accidentally dropping out.

The full venturi incorporated in this

more light toward the CEILING

means more seeing comfort BELOW!

• • • new Benjamin Diffuser-Reflector now delivers almost TWICE THE UPWARD LIGHT!

- **increases brightness control for greater uniformity of light**
- **eliminates annoying shadows that distract from work**
- **reduces contrasts that can cause eye fatigue**

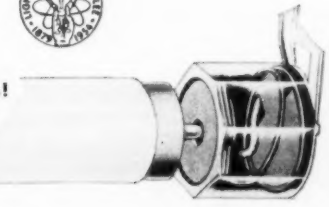
This improved, all-porcelain-enamel Benjamin Diffuser Reflector enables you to utilize highest light levels and still enjoy comfortable seeing conditions, without materially reducing lighting efficiency.

The answer lies in a series of 14 apertures, located on the top of the reflector, 7 above each lamp. Together, they direct 12.6%* of the light toward the ceiling. This greater upward light helps relieve disturbing contrasts between upper and lower room areas. It wraps the entire room in *uniform illumination*, so important in reducing eye strain and fatigue caused by excessive brightness contrast. For further details and lighting data, send for Data Bulletin. Benjamin Electric Mfg. Co., Dept. PE, Des Plaines, Illinois.

**for 2-lamp units. 10.7% for 3-lamp units. As compared with 6.7% and 5.8% respectively, delivered by previous Benjamin diffuser-reflectors.*

. . . and of course, it has "SPRINGLOX," the exclusive, metal-clad lampholder!

distinguishes Benjamin Diffuser-Reflector from all similar units! cuts out-of-service time due to socket failure . . . lamps cannot drop out or be shaken loose . . . never fails to make electrical contact the *first* time . . . patented spring construction is the secret!

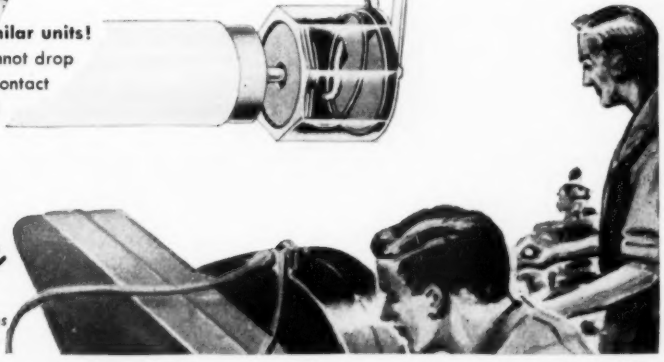


BENJAMIN
TRADE MARK

Diffuser-Reflector

Sold exclusively through electrical distributors

available in open-end and closed-end units, for single or bi-pin lamps



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WHEREVER CATERPILLAR-BUILT PRODUCTS ARE MADE
YOU'LL FIND MATHEWS CONVEYERS

Wheel and tire assemblies are handled with Mathews Conveyers at Caterpillar Tractor Co.

Mathews Conveyer Company is glad to have an opportunity to salute the great Caterpillar organization, which is this year celebrating 50 consecutive years of continuous production of track-type tractors. The growth of that company has been a phenomenal one, and its product, the crawler tractor, is, in its 50th year, better and busier than ever before.

Mathews Conveyers were put to work by Caterpillar Tractor Co. nearly 30 years ago and today, as then, many of Caterpillar's world-famous products are handled with Mathews power and gravity conveyers and special conveying machinery.

We have slanted the August issue of our company publication, "What's New With Mathews," to Caterpillar progress. Copies of this are yours for the asking. Remember, too, that the service of your nearby Mathews engineer is available to you for the discussion of your handling problems.

MATHEWS CONVEYERS

GENERAL OFFICES . . . . . *Mathews Conveyer Company*
ELLWOOD CITY, PENNSYLVANIA
PACIFIC COAST DIVISION . *Mathews Conveyer Company West Coast*
SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . . . . . *Mathews Conveyer Company, Ltd.*
PORT HOPE, ONTARIO
ENGINEERING OFFICES OR SALES AGENCIES IN PRINCIPAL AMERICAN AND CANADIAN CITIES

For more facts circle 614 on Reply Card

NEW PRODUCTS

(Begins on page 132)

heater is said to contribute to extremely quiet operation, and company engineers have grouped the heaters into four classifications, according to quietness levels. Class I units are announced as suitable for private offices and similar areas where almost noiseless operation is desired. Class II units are suggested for show rooms and similar places, and Class III and IV units for use where relatively higher noise levels can be tolerated. Available in both one- and two-row coils, these heaters have outputs from 40,000 to 580,000 Btu. Union Asbestos & Rubber Co.

67—PAINT STRIPPER for use on many surfaces

Walgarite 10 is announced as a nonflammable, odorless, solvent-type stripper — so formulated that it removes industrial lacquers, vinyls, phenolics, and rubber-base, epoxy and baked-on finishes, as well as maintenance type protective coatings. Walgarite 10 is made in a heavy viscosity so that it will adhere to vertical surfaces without sag. It dissolves and wrinkles the finish, it is pointed out, so that the old finish can be flushed off with water, leaving the base surface ready for repainting.

According to company, this paint stripper can be used on all types of metal, wood and concrete without deleterious effect. It is declared safe to use and non-burning to the skin. The Corrosion Control Co., Inc.

68—FLOW REGULATOR for plumbing, heating uses

Of brass construction, this low cost valve is designed for automatically controlling the flow of water through a wide range of pressures. It is pointed out that because of a self-cleaning action while in operation, the valve is not easily clogged. It is suggested for use in tankless heaters, drinking fountains, condensers, hot water heaters. The valve comes in ½- and ¾-in. pipe sizes for capacities from 2 to 8 gpm. Bulletin GE-854 gives selection and installation data. Bell & Gossett Co.

69—ELECTROCLEANER can be used on steel, copper

Pensalt K-8 is a heavy duty electrocleaner suggested for use on copper and steel, and said to provide excellent detergency properties with unusual ability to remove mill oil and smut from steel prior to electroplating. According to manufacturer, this is accomplished through a new concept in the use of surface active agents. The cleanser is a granular, anhydrous product containing active ingredients which resist neutralization by acid soils, it is explained, and it provides good electrical conductivity. It is claimed free rinsing and resistant to the effects of hard water. Product information and control data are available on Pensalt K-8. Pennsylvania Salt Mfg. Co.

GENERAL CABLE

THE GREATEST NAME IN ELECTRICAL WIRE AND CABLE

POWER TWINS

...Newest, Most Practical Team for Plant and Equipment Wiring

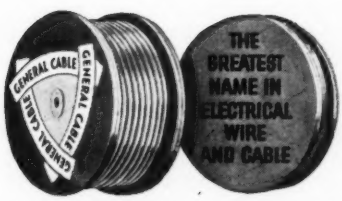
VARNISHED CAMBRIC OR RUBBER INTERLOCKED ARMORED CABLES

SAFETY m. i. WIRING SYSTEMS

The famous Power Twins combine lower installed costs with unique adaptability. They are ideal for electrical wiring without conduit in close areas and under, down and around beams and pillars...where power needs vary... where plant layout presents difficulties.

Varnished Cambric or Rubber Interlocked Armor Cable is designed for both low and high voltage requirements, (lighting and power control) and is available with steel, bronze or aluminum armor.

Safety m.i. Wiring System, all mineral insulated and exclusive with General Cable, is ideal for all applications up to 600 v. where heat, vapors, moisture, aging are of particular concern. Lower installed cost! Small diameter saves space! Trains easily for neat, compact installation. Investigate this popular combination before you buy. They can save you time and money.



BARE, WEATHERPROOF, INSULATED WIRES and CABLES FOR EVERY ELECTRICAL PURPOSE

GENERAL CABLE CORPORATION

420 Lexington Avenue, New York 17, New York • Sales Offices: Atlanta • Boston Buffalo • Chicago • Cincinnati • Cleveland • Dallas • Detroit • Greensboro N. C.) • Houston • Indianapolis • Kansas City • Los Angeles • Memphis (Milwaukee • Minneapolis • New York • Newark (N. J.) • Philadelphia • Pittsburgh • Portland (Ore.) • Richmond (Va.) • Rochester (N. Y.) • Rome (N. Y.) St. Louis • San Francisco • Seattle • Syracuse • Tulsa • Washington, D. C.

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During the winter, the continual opening of doors in this dock area used by the Joliet Wrought Washer Company, Joliet, Illinois, made the area too cold for efficiency . . . until a Herman Nelson Portable Heater solved the problem!

Why does Herman Nelson outsell all other portable air heaters?

Because: indoors or outdoors, Herman Nelson Portable Air Heaters are best for any job

HERE ARE THE FACTS! Complete safety indoors . . . clean, fume-free, heated air in the working area, with all dangerous gases vented outside!

Maximum efficiency outdoors . . . with flexible canvas ducts channeling heat right to the spot where you need it!

More than 30,000 Herman Nelson Portable Heaters are in use today. Whether you buy, rent, or lease, you'll get the best deal if you see your Herman Nelson Distributor first. FLEET OPERATORS: Ask about our Fleet Users' Replacement-Leasing Plan . . . learn the *extra* advantages in standardizing on Herman Nelson!

AAF herman nelson

HERMAN NELSON

Best Known Name In

PORTABLE AIR HEATERS

DIVISION OF AMERICAN AIR FILTER CO., INC

MOLINE, ILLINOIS

FREE! MONTHLY WEATHER FORECASTING SERVICE

Better than 85% accurate over the past three years!

HERMAN NELSON
Division of American Air Filter Company, Inc.
Dept. 81, Moline, Illinois

Please send me your monthly weather forecast chart, with no cost or obligation to myself.

☐ We are in the market for a portable air heater. ☐ We are not in the market, but would like information for our files.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

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NEW BOOKS

for the plant engineer

Industrial Engine Lubricants

LUBRICATING OILS for Industrial Engines. Size 8⅜ by 5½ in.; 44 pp; paper bound. Published by Internal Combustion Engine Institute. Price 20 cents each; postage additional for shipment of more than one copy.

BOOKLET LISTS trade-names of over 1200 lubricating oils offered by 366 oil companies. These are reported to meet three types of requirements in heavy-duty industrial engine operation. The publication does not involve itself in any pros or cons as to the merits of the products.

Under type A, the oils as reported by the suppliers meet the requirements of U. S. military specification MIL 0-2104 and/or British Defense Specification DEF/2101, wherein the diesel engine test uses a fuel of 0.35 per cent minimum sulphur content.

Classification B covers oils which are reportedly qualified to satisfy requirements of U. S. military specification MIL 0-2104 wherein the diesel engine test is modified by using a fuel of 0.95 per cent to 1.05 per cent sulphur content.

The oils under type C are represented by the suppliers as meeting the more severe requirements of a "Superior Lubricant, Series 2."

Work Measurement

TIMESTUDY FOR COST CONTROL by Phil Carroll. Third edition; size 9 by 6 in.; 301 pp, illustrated; cloth bound. Published by McGraw-Hill Book Company, 330 West 42nd St., New York, N. Y. Price $5.00.

WRITTEN in a simple manner which lends itself to easy reading, this manual covers the subject of timestudy quite extensively. It should be of value in plants where the expense of using moving picture equipment is considered prohibitive and lengthy.

This is an improved edition containing new material and illustrations. These include an outline of Basic Motion Timestudy, examples of predetermined time standards, alignment chart approach which can be used in salary evaluation, and results of tests that are given to aid in the determination of a proper person to be engaged in timestudy work.

The author gives attention to the use of the standard data method which is reported to give better measurement than "ratesetting" methods used by many people in timestudy. He covers

Here's how to:

Spiratube®

Here's a completely different type of ducting specifically designed to meet today's imperative need for reduced plant maintenance and operational costs. Spiratube is a highly flexible, lightweight, easy-to-install duct made of continuous helical coils of spring steel reinforced with overlapping plies of tough, multicoated fabric.

Modernize your operation

With Spiratube you can put even your oldest machining operations years ahead. Now, with Spiratube, you can eliminate such maintenance-heavy set-ups as ball-and-socket joints, rigid ducting in off-center mixing operations — and the like. Spiratube rides with ease through any operation where an exhaust hood must follow the work. For instance, more and more woodworking operations are using Spiratube in place of more cumbersome ball-and-socket systems, and many important buffing operations are more modern, trouble-free with Spiratube at the end of moving exhaust hood.

Cut fume removal and air handling costs

You're missing a good bet if you haven't discovered the many advantages of using Spiratube as an important part of your ducting system. It is a lightweight, retractable, noncollapsible ducting offering optimum flexibility to take tight turns up to 180° without buckling! And, because YOU can install Spiratube yourself in a fraction of the time it takes to install rigid ducting, you save money . . . and production downtime. No special elbows or fittings are needed with Spiratube.

Simplify plant maintenance

There's a type of Spiratube available for every important maintenance operation in your plant . . . as an integral part of your dust-collection system, for the transfer of fumes or light solids, or even for the removal of abrasive chips from large automatics. And remember, you install Spiratube when and where you need it — yourself!

Adapt your exhaust to the work

Spiratube ranks unchallenged for the removal of paint and welding fumes, gases, and odors, for, when connected to permanent or temporary exhaust systems, its amazing flexibility permits you to bring the exhaust to the very origin of the fumes . . . eliminating the cost and time of moving the work to the exhaust.

with

FLEXIBLE'S LINE OF TUBING

. . . industry's most versatile ducting

Flexible Tubing

CORPORATION

Guilford, Connecticut

Pasadena 1, California

Where to get FLEXIBLE's line of ducting

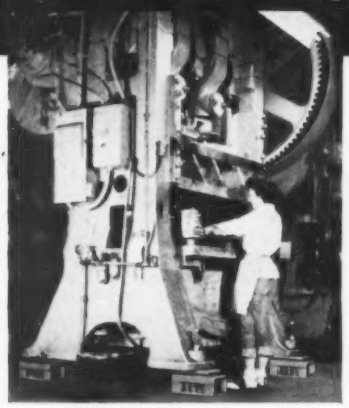
Spiratube is available from well-stocked distributors from coast to coast in diameters of from 3″ to 30″ with various fabrics and coatings and a special Thermaplastic Scuffstrip for extra rough usage.

For diameters less than 3″, or where wide temperature and pressure ranges are a big problem, ask your local Flexible Tubing Distributor about Flexflyte.

WRITE FOR ILLUSTRATED CATALOG C2-4

For more facts circle 617 on Reply Card

For a VIBRATION-Free Press Department...



This large press creates severe shock and required complete vibration control. Korfund Steel Spring Vibro-Isolators with adjustable leveling bolts (a Korfund feature for over 30 years) so completely solve this problem that no shock can be felt in the floor even right beside the press.

One of the many smaller punch presses. Since the size and location of these presses did not require the maximum isolation efficiency provided by spring isolators, Korfund recommended mounting them on low cost VPS Elasto-Rib Dampers.

Use Korfund Isolation

These installations, at McCurdy Manufacturing Co. at Detroit, illustrate a typical Korfund Vibration Control Service.

Korfund believes one product, or even one type of product cannot solve all vibration problems *efficiently* and *economically*. Korfund makes and offers several different types — each one designed for a specific set of conditions.

When you bring your vibration problem to Korfund, you get impartial recommendations on media whether it be springs, rubber or cork, alone or in combination. Our main interest is your satisfaction.

For your free equipment isolation Selector Chart and additional data on increasing production and reducing costs, write for your copy of Bulletin 22, or see our catalog in Sweet's Files.

For specific recommendations, contact us or your local Korfund office. A half-century of experience is at your disposal.

Bolting to floors is eliminated with Korfund Steel Spring Vibro-Isolators or VPS Elasto-Rib Dampers in most cases — yet either type mounting can be bolted if desired.

THE KORFUND CO., INC.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

48-35R Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

For more facts circle 618 on Reply Card

the responsibility of management in timestudy and devotes an entire chapter to the building of a standards department. Some of the other topics considered are: Training of men to rate; analysis of variables; setup time; writing the standard data; charting standard data; and work standards.

Scientific Method

METHODS OF REASONING by P. D. Scott. Size 11 by 8½ in.; 16 pp; paper bound. Published by Cleveland Engineering Society, 2136 East 19th St., Cleveland 15, Ohio. Price $1.00.

THIS BOOKLET contains a condensed version of the scientific method, exposing to the reader a useful technique of problem solving and decision making.

To show the method in use the author includes a number of problems involving real cases. Two of these deal mainly with people, one with a plant and another with a process.

Some of the chapter headings are as follows: Where do facts come from?; thought patterns; before the fact and after the fact; what rules are; precept and concept; and how we learn.

For the Safety-Minded

SAFETY DEVICES AND IDEAS. Size 11 by 8½ in.; 47 pp; illustrated; paper bound. Published by National Safety Council, 425 No. Michigan Ave., Chicago 11, Illinois. Price $1.25 members; $2.50 non-members.

OUT OF THE GADGET show sponsored by the Chemical Section of the National Safety Council during the 1953 Safety Congress come the many devices that this publication covers.

All ideas that this booklet presents have been tried in industry with results. A large share of these can not be obtained commercially. However, the reader is free to borrow any of the ideas for use in his plant.

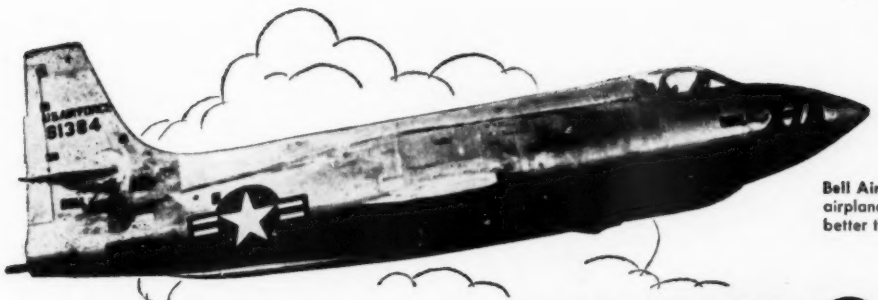
Each of the illustrations is accompanied by a caption which should help the readers in studying the application of the ideas. Included in the coverage is the name and location of the company that put each idea to use.

How to Manage a Small Plant

PROFITABLE SMALL PLANT MANAGEMENT by Malcolm H. Gotterer. Size 5½ by 8½ in.; 318 pp; illustrated; cloth bound. Published by Conover-Mast Publications, Inc., New York, N. Y. Price $5.50.

ANYONE CONNECTED with the operation of a small plant will find many useful pointers and helpful suggestions in this book for the profitable management of a small plant.

The book is intended to serve the



Bell Aircraft's X-1A —world's fastest airplane that broke the sound barrier at better than 1600 miles per hour.

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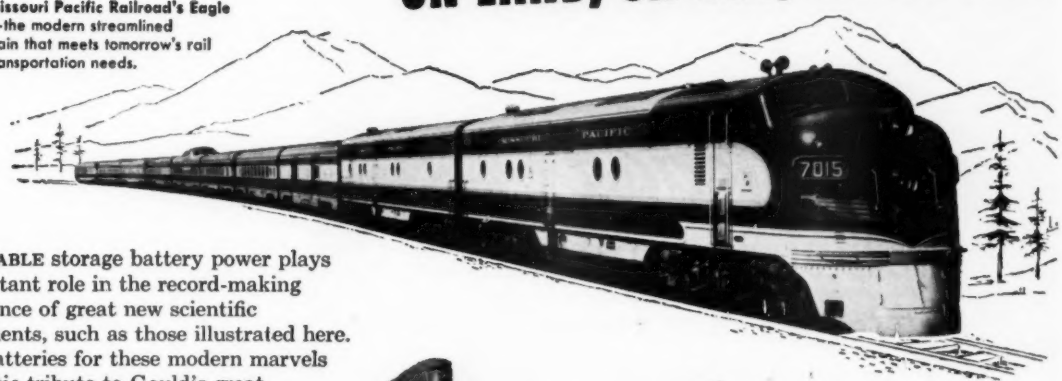
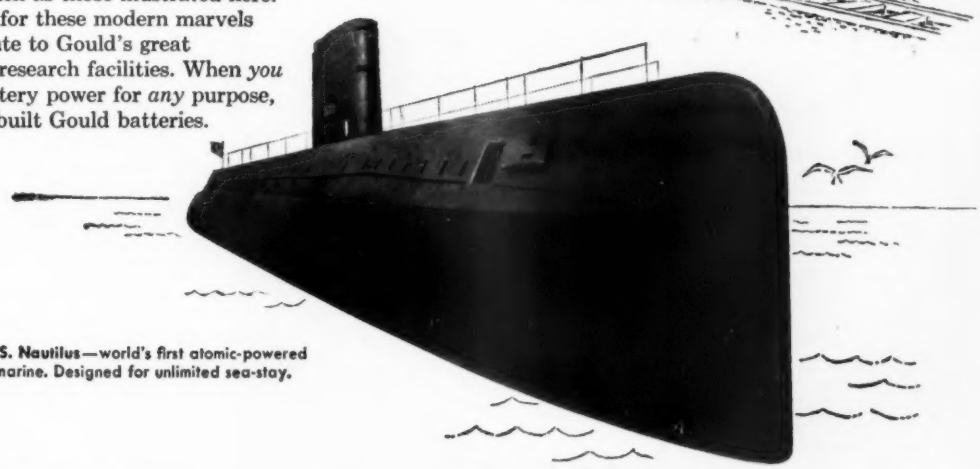
Missouri Pacific Railroad's Eagle —the modern streamlined train that meets tomorrow's rail transportation needs.



DEPENDABLE storage battery power plays an important role in the record-making performance of great new scientific achievements, such as those illustrated here. Gould Batteries for these modern marvels is dramatic tribute to Gould's great engineering and research facilities. When *you* need storage battery power for *any* purpose, choose research-built Gould batteries.



U.S.S. Nautilus—world's first atomic-powered submarine. Designed for unlimited sea-stay.

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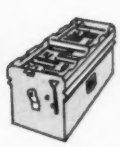
Batteries

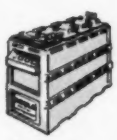
GOULD-NATIONAL BATTERIES, INC.
TRENTON 7, N. J.

For Railroad Air Conditioning and Lighting



For Mine Shuttle Cars and Locomotives

For Electric Industrial Trucks



For Diesel Locomotive Starting

For Standby and Emergency Power

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Always Use Gould-National Automobile and Truck Batteries

For more facts circle 619 on Reply Card

needs of three groups: First, those who wish the information to formulate a sound and profitable cost reduction or management development program. Second, those who are faced with the problem of supervising and evaluating the results of management specialists. Third, to satisfy the thirst for knowledge of scientific management theories and applications found among many small plant owners and managers.

Points to consider in the management of a small plant and which are aptly explained by the author, include: the organization, plant layout, methods improvement, job evaluation, production standards, incentive wage plans, merit rating, production control, materials management, manpower management and cost control.

Welding Fundamentals

METALS AND HOW TO WELD THEM by T. B. Jefferson and Gorham Woods. Sizes 8⅞ by 5⅞ in.; 322 pp; illustrated, cloth bound. Published by the James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio. Price $2.00.

FOR ENGINEERS OR students, this book brings a collection of basic information that is presented in a style conducive to easier understanding.

The book offers facts on metallurgy which help bring about a better appreciation of the mechanics of joining metals and results to be expected.

Separate sections cover the mechanical and physical properties of metals. These are followed by brief descriptions of many different types of welding. Individual chapters are given to coverage of low, medium and high carbon steel welding. Alloy steels, cast iron, and non-ferrous metals are given attention in other sections. The authors also present a number of tips on the making of good welds.

Appendices include an extensive dictionary of welding terms, hardness conversion table, melting points of metals.

Safety Standards

HANDBOOK OF INDUSTRIAL SAFETY STANDARDS. 9th revision; size 8 by 5⅜ in.; 315 pp including index; illustrated; paper bound. Published by Association of Casualty & Surety Companies, 60 John St., New York 38, N. Y. Price $1.40.

FIFTY PER CENT larger than the previous edition, this authoritative handbook includes new chapters, illustrations and tables. Much of the text material enlarges upon the various codes from which the information has been drawn.

Portions of the manual are given to topics not covered by any existing standards. At the end of most of the sections, there is a reference list which names codes that are applicable to the subject covered in the chapter.

Aluminum Processing

FORMING AND BENDING KAISER ALUMINUM. Size 8½ by 5⅜ in.; 260 pp excluding index; illustrated; cloth bound. Available from Kaiser Aluminum & Chemical Sales, Inc., 919 No. Michigan Blvd., Chicago 11, Illinois. Price $2.00.

MORE THAN 200 illustrations appear in this comprehensive book covering the processing of aluminum. The book carries descriptive information on forming, bending and spinning.

Various types of press designs as well as other machinery involved in shaping aluminum are considered in this publication.

Engineering and other data is presented in table form. In addition, an extensive glossary pertaining to metal and metalworking is offered.

Among the seven main sections are the following: Forming aluminum in rubber; bending aluminum pipe and tube with power and hand operated bending machines; tensive and compressive aluminum forming.

LOGAN AIR AND HYDRAULIC POWER
SPEEDS • COORDINATES • REFINES PRODUCTION
IN OVER 10,000 INDUSTRIAL PLANTS
AIR-DRAULIC CYLINDERS • AIR and HYDRAULIC PRESSES • COLLET GRIP TUBE FITTINGS • SURE-FLOW COOLANT PUMPS • HYDRAULIC POWER UNITS • HYDRAULIC CYLINDERS • HYDRAULIC CONTROL VALVES • AIR CHUCKS • AIR CONTROL VALVES • AIR CYLINDERS
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Standard bores from 3" to 8". Standard strokes to 5'.
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. . . Buell 'SF' Electric Precipitators PROVE IT AGAIN!

Spectacular on-the-job performance started engineers talking . . . and it's been music to our ears ever since.

Our engineering friends have marvelled at low maintenance costs . . . at brand new efficiency records . . . at the wide range of different and complex dust recovery problems that are being solved by Buell's 'SF' Electric Precipitators.

We will be happy to demonstrate the finer points at any time. Such standard Buell features as continuous rapping . . . convenient remote control from a central switchboard . . . the proved efficiency of the exclusive Buell Spiralectrode, are all elements of simple overall design.

Dozens of Buell 'SF' Electric Precipitators are already operating or in the works. Get the complete facts now. Write for our informative Brochure "The Collection and Recovery of Industrial Dusts" which tells about *all three* Buell Systems of industrial dust recovery. Write today! Buell Engineering Company, Department 14-J, 70 Pine St., New York 5, N. Y.

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MECHANICAL ELECTRICAL

20 Years of Engineered Efficiency in
DUST RECOVERY SYSTEMS

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JADE-LITES SPEED PRODUCTION AT PHILADELPHIA THERMOMETER CO.

Lustra Jade-Lite Fluorescent Tubes reduce glare, eyestrain, reports General Mgr. L. W. Scanlan

PHILADELPHIA, PA.—The Philadelphia Thermometer Company in this city has discovered a simple new way to speed production, according to L. W. Scanlan, General Manager.

The new method consists of a Lustra Jade-Lite lighting system recently installed in the production department in place of the formerly used slimline and fluorescent tubes. "The old lighting system," says Mr. Scanlan, "caused an annoying amount of glare. At the suggestion of our local Lustra man, we installed Lustra Jade-Lite Fluorescent Tubes and immediately both glare and eyestrain were substantially reduced, with the end result that production has been substantially speeded."

THE LUSTRA JADE-LITE. Reports from the Philadelphia Thermometer Company and other industries throughout the country, indicate its superiority for precision work.

AFTER CONFERRING WITH A LUSTRA MAN, the Philadelphia Thermometer Company decided to replace ordinary slimline and fluorescent tubes in production department with Lustra Jade-Lites. Result was elimination of eyestrain, speed-up of production.

Lustra Corporation reports similar results with their lighting in plants throughout the country and makes this statement to all plant-men: "You can definitely improve lighting efficiency and production in your operation with the Lustra Lighting Line."

For information write: Lustra Corp., Dept. PE-10, 111 Water Street, Brooklyn 1, N. Y.

For more facts circle 622 on Reply Card

INDUSTRIAL FILMS

Waterless Washing

"WASHING WITHOUT WATER" is the title of a new film which covers the development and production of a soapless skin cleaner and waterless washstations.

The film, NAM Reel No. 189, is sponsored by the National Association of Manufacturers. A written request to the Sugar Beet Products Company, Saginaw, Mich., will bring further information on this and other new films on the same subject.

Getting the Most from Facilities

FIVE BASIC STEPS which industry can follow to increase productivity are outlined in a new 25-minute, color film, "Productive Maintenance." Steps to be followed to get the most out of existing facilities are: (1) Gather complete equipment data; (2) Evaluate routine maintenance so that equipment costs determine how much care is warranted; (3) Establish a routine operating control system; (4) Evaluate critical maintenance, and (5) Establish a critical maintenance program.

Produced under the supervision of General Electric Company's visual education section, the film is being shown in conjunction with a series of Productive Maintenance Forums. Afterwards it will be available for showings at meetings.

Shell Molding

TWENTY-FIVE-MINUTE sound slidefilm "Shell Molding and You," is now available for showings.

The 35 mm color film describes the advantages of shell molding over other casting methods, affording a step-by-step demonstration of shell molding operations at General Electric's new experimental foundry in Pittsfield, Mass.

Included in the visual presentation is a brief, interesting history of metal casting in cartoon form, showing how shell molding fits into the evolution of metal casting technique.

The slidefilm may be borrowed for showings by writing General Electric Company, Chemical Materials Dept., Pittsfield, Mass.

Hydraulic Units

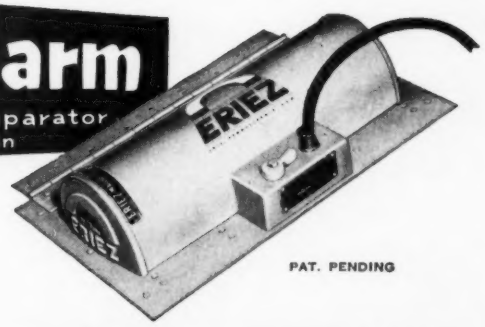
LECTURE PROGRAM of four-color slides designed to broaden the understanding of the operation of hydraulic

The Dramatic Answer for Top Efficiency in Guarding Against Tramp Iron Danger

it's the new

Magnalarm

---- a magnetic separator with a brain



PAT. PENDING

YOU'LL be delighted with this great new "Magnalarm" line. Here's why:

The new "Magnalarm" line . . . complete in 3 magnetic strengths and 35 standard sizes from 4" to 72" . . . combines a revolutionary automatic alarm system with Eriez permanent magnetic separators . . . developed to tell you *automatically* when separators have accumulated so much tramp iron that their efficiency is lowered below minimum requirements!

How would *you* want to be signaled? By a light on the machine or in a far-off office? By a bell or a buzzer sounding? Or, for ultimate safety, by your machinery shutting off? You can be signaled by any of these optional systems. And, just to make positive the tramp iron *is* removed, the light stays on or the bell keeps sounding or the machinery stays shut off until the magnet face is cleaned!

WHAT BENEFITS "MAGNALARM" BRINGS TO YOU:

1. **Assures the greatest possible magnetic efficiency!**
2. **Affords *maximum* protection against fires, machinery damage and product contamination caused by tramp iron!**
3. **Saves time . . . unnecessary shut downs for inspections are discontinued!**
4. **Gives you quality control on the tramp iron to be found in various runs of materials!**
5. **Plus all the other advantages of Permanent Magnets!**

HOW "MAGNALARM" WORKS:

The heart of the "Magnalarm" is the ferrometer . . . a device which measures the accumulation of tramp iron on a magnet. "Magnalarm" opens and closes a circuit to which your special alarm is attached when a pre-set amount of tramp iron is caught. This degree is pre-set at the Eriez factory to meet the normal requirements . . . but it may easily be changed by you at your location if a change is desired.

The only electricity used is that which sets off the electrical device connected with the "Magnalarm". No other electricity is used because the Eriez separator is still a self-contained, non-electric unit which holds its magnetic power indefinitely. The electricity used in the alarm in no way affects the strength and magnetic field of the powerful magnetic material, ALNICO V.

COST AND INSTALLATION

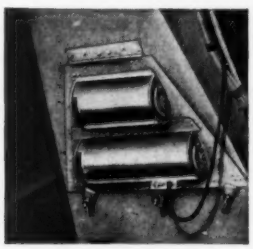
"Magnalarms" are easy to install (simple installation instructions come with each unit) and do not require any maintenance until the signal is given for cleaning. The cost of the "Magnalarm", fully guaranteed by Eriez, is but a fraction more than that of an ordinary old-type magnetic separator!

No one else has "Magnalarm" or anything like it! Count on Eriez to stay in front! Count on Eriez to give you the latest in magnetic equipment.

TYPICAL "MAGNALARM" SITUATIONS:

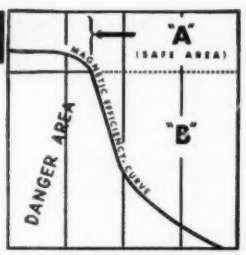
1. A maintenance man who is in charge of cleaning the magnets overlooks a magnetic separator . . . but he is quickly reminded by the "Magnalarm" before it is too late!
2. A magnetic separator in a difficult position or in a remote spot misses inspection and cleaning . . . but with the "Magnalarm" acting as an automatic "baby sitter", no one has to waste time or effort "inspecting" . . . the "Magnalarm" notifies those concerned that cleaning time has come.
3. A batch of raw material, for example, might contain an unusual amount of tramp iron which the Eriez magnetic separator catches . . . but is "off-guard" until the magnet is cleaned. "Magnalarm" tells you when this happens.

An Eriez "Magnalarm" installed on a Gravity Flow Hump signals the presence of tramp iron in this hard-to-get-to, enclosed, food processing line.



Eriez Double Row "Magnalarm" installation assures top efficiency in keeping tramp iron out of this rubber reclaiming line, protecting the sizing screens ahead.

MAGNETIC EFFICIENCY AS GOVERNED BY TRAMP IRON ACCUMULATION



"Magnalarm's" signaling action makes sure you operate only in the strong, safe range marked "A". An ordinary plate magnet's strength will be lowered by tramp iron accumulation to the inefficient operating danger area marked "B" unless plates are checked and cleaned frequently.

WRITE FOR EXCITING, FULL DETAILS

Even though we have developed "Magnalarm" and are naturally in love with it, we think you'll get a thrill too, when reading about the full story of "Magnalarm" in a free brochure which is yours for the asking. Sizes. Magnetic strengths. Types of installation. Construction. Electrical circuits. Type of ferrometer element. Special features. Even how to order. It's all there.

Fill out the easy coupon below. Do it yourself . . . or do it for someone within your organization who will be grateful for the information.

ERIEZ

Eriez Manufacturing Company
71K Magnet Drive, Erie, Pa.

ERIEZ

Send me the "MAGNALARM" literature

Name .....

Address .....

City ..... State .....

Company ..... Title .....

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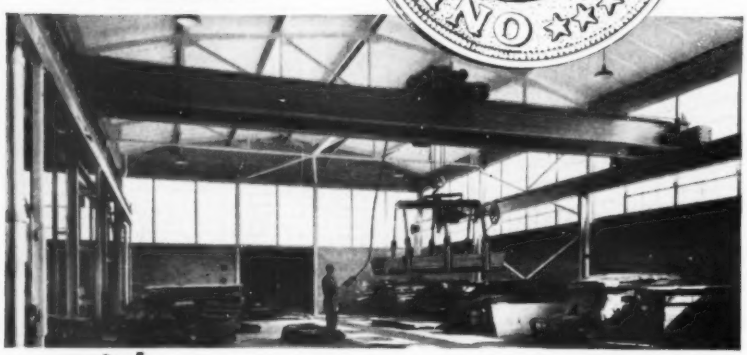
Get the Most for Your CRANE DOLLAR

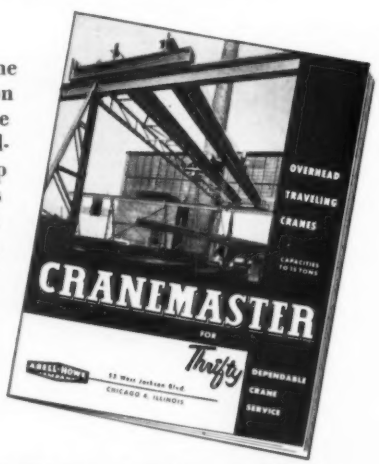


with

CRANEMASTER

- **Standardized models fit virtually every building condition—save you special engineering costs.**
- **Modern sequential production techniques cut manufacturing costs—*and* your initial expenditure.**
- **Top quality materials and proven design give long-term operating efficiency and minimum maintenance.**

If you are looking for real crane value, get complete details on CRANEMASTERS . . . compare value-for-value, dollar-for-dollar with any other units up to 15 tons capacity, with spans to 60 feet. The new Bulletin illustrated here will help show you why you get the most for your crane dollar with CRANEMASTER. Write for your free copy now.



Ask for Bulletin C-116

ABELL-HOWE COMPANY **53 West Jackson Blvd., Chicago 4, Illinois**

For more facts circle 624 on Reply Card

components has now been completed.

These slide lectures, which will be made available for use in colleges, engineering societies, and company training programs, cover the following hydraulic components: axial piston pumps and motors, vane pumps or motors, directional valves, surge damping valves, flow controls and hydrostatic valves.

From six to 15 four-color slides are used to describe the operation of the hydraulic units in this series. The number of slides is determined by the complexities of the unit.

For information on the entire program or the slide-lecture on any component, write Marion Burton, Advertising Manager, The Denison Engineering Company, 1236 Dublin Rd., Columbus, Ohio.

Packaging

AN 11-MINUTE film explains the principle of the retractable anvil stapling machine, and how it drives and clinches staples to close corrugated or fibre boxes, tops and bottoms simultaneously, from the outside after they are filled.

It also explains the automatic centering device and the floating roller, and how they function to accommodate boxes of varying or mixed sizes.

The camera takes the viewer into plants where retractable anvil stapling equipment is being used. There he is shown in factual, case-history style how users of the equipment have substantially reduced packaging costs.

Prints of the movie, "Package for Profit" are available for loan on a no-charge basis from the International Staple and Machine Company, 801 East Herrin St., Herrin, Illinois.

Industrial Trucks

DEVELOPMENT OF the industrial truck since 1913 and its many uses is illustrated in a new motion picture on materials handling.

Titled "Powered Industrial Trucks," it is a composite of sequences from 20 films submitted by 10 member companies, Material Handling Institute.

The film is designed as a teaching aid for instructors in materials handling at college level. Made in black and white and running about 25 minutes, it is the first in a series of educational motion pictures to be made on materials handling equipment.

Copies of the film are available for sale or rent through the College-Industry Committee on Material Handling Education. Inquiries should be addressed to the secretary of the committee, Irving Footlik, 8338 S. Dante, Chicago 19, Illinois.

Dust-Free Conveying System

(Continued from page 89)

be extended in two directions.

The manufacturing area at present measures 100 ft by 74 ft, with a clear area of 40 ft from the floor to the base of the trusses. Only 2,400 sq ft of floor space is needed for the two 100-ton storage silos, with all their related equipment and machinery. Room has been left for six more silos of the same size. Since the structure can be extended 135 ft to the north and 170 ft to the east, the present potential capacity of eight silos can be multiplied several times.

The entire conveying and processing installation is completely enclosed and dust-tight. A negative pressure is maintained in the system by the dust collecting equipment, with one collector for pitch dust and one for sea coal dust. The collectors may be operated in combination or independently.

Dust collection in the plant has both physical and economic purposes. Its primary purpose is to eliminate the hazard of spontaneous combustion of dust-saturated air. At the same time, collecting the dust improves working conditions in the plant. On the economic side, the dust is a valuable product in itself. It may be bagged and sold separately, or, more generally, blended with the other raw materials to obtain end products with various characteristics.

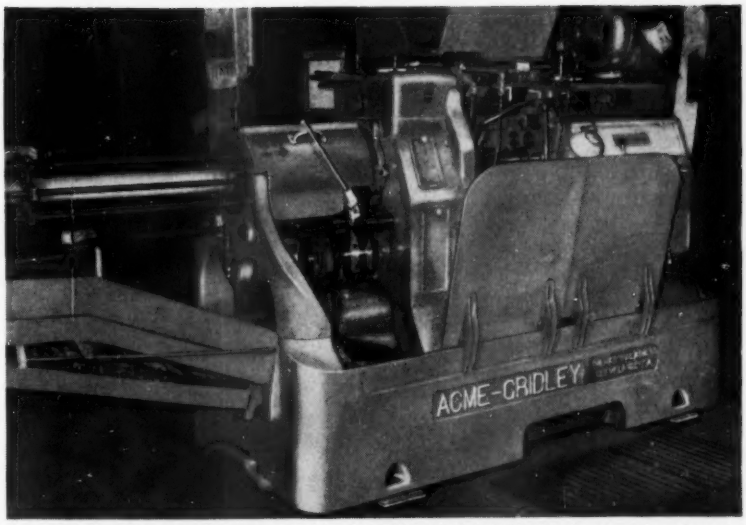
All electrical equipment in the manufacturing and warehouse areas is explosion proof (Class II, Group F). All controls are interlocked to prevent an operator from starting or stopping the process equipment in the wrong sequence. Automatic magnetic separators are used to remove tramp iron from coal and/or pitch, thus protecting the process equipment from damage.

The selection of proper drives permitted the use of identical 75-hp, 1800-rpm, explosion proof motors to power the pitch pulverizer, operating at 1800-rpm, and two coal pulverizers, operating respectively at 1200 and 3600-rpm. Thus only one spare motor must be kept on hand, instead of the three normally required.

Ryan's Floating Islands

(Continued from page 97)

fund coiled steel springs placed along the bottom edges of the pits. Made of cold-rolled steel, each of these vibration isolators is capable of absorbing a force of 2800 lb per inch of deflection. More than 100 of them are



Acme-Gridley 5/8" automatic screw machine in REPUBLIC AVIATION CORP. plant, Farmingdale, Long Island . . . showing UNISORB mounting pads under machine base. No costly floor drilling to install this machine.

AT AN AVERAGE COST OF LESS THAN $10.00 YOU CAN REDUCE VIBRATION, INSTALL MACHINES SECURELY ON

UNISORB®

MOUNTING PADS

Your first saving when using UNISORB is in the cost of the mounting pads, an average of less than $10.00 per machine. And savings in first cost are only the start. You also save 10% to 30% in time and labor for installation, because with UNISORB you do not have to drill floors . . . or patch floors when you move machines.

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FACTS ABOUT UNISORB INSTALLATIONS:

1. Transmitted machine vibration is reduced up to 85%.
2. Installation is safe, secure. Even cold headers are securely mounted on UNISORB.
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located in the larger installation to absorb the vibration from the inertia block.

A good analogy of this arrangement would be the circus act in which a blacksmith's anvil is placed upon the chest of a strong man and two performers pound on it with heavy sledge hammers. The anvil absorbs the impact, transmitting it gradually to the strong man's chest. The larger the mass of the anvil, the less the effect of the blows is felt by the strong man.

However, in designing a vibration absorbing foundation for large machines such as these, careful consideration of the laws of impact and vibration must be made. The weight of the inertia block struck by the hammer must be great enough at the moment of impact to provide sufficient inertia so that elastic deformation does not occur. Also, the block must come to rest before the next blow is struck. The mass and period of vibration of the block must be controlled so that the amplitude of movement is within acceptable limits and acceleration must not exceed that due to the force of gravity.

Starting with the impact loads and vibration frequencies of the Cecostamps, the inertia blocks were designed to attain the most desirable insulation characteristics and maintain the impact force of the machines. From these data, it was determined that the total force to be transmitted to the foundation, for the larger installation, would be 342,500 lb. This figure governed the number and capacity of isolating springs used.

For physical reasons, the vibration frequency of the machine should be considerably different than that of the isolating medium. If this proportion were reduced to a one-to-one ratio, the machine would be in resonance with its foundation and a dangerous condition would exist. Under this condition large amplitudes of motion and excessive forces can be transmitted. For this reason, marching troops are cautioned to break step when crossing a bridge. Otherwise, the vibration frequency of their march might be resonant with the natural oscillation rate of the bridge causing the full impact of their marching energy to be simultaneously transmitted to the bridge structure.

In operation, the inertia blocks receive the impact of the Cecostamps, hesitate momentarily and depress the supporting springs ⅜ of an inch. The huge foundations oscillate until the energy is dissipated, through friction.

Coiled steel springs are, in this installation, an ideal material because they can be precisely designed to deliver specific capacities. Their characteristics depend upon their dimensions, design and heat treatment. They have a damping coefficient of less than one-half of one per cent. Damping subtracts energy from the machine, in the form of heat, and places an added strain upon the foundation.

The Ryan plant is built upon sandy soil dredged up from the San Diego Bay. This soil was not considered suitable for sustaining the Cecostamps' foundations because of its low bearing characteristics. The foundations would tend to sink and the soil would have an undesirable damping effect upon the foundations. Consequently, pilings were driven to a depth of 50 ft where a layer of shale underlies the sandy soil. These were capped with a three-foot thick concrete cap. The concrete pits were poured on top of these caps.

The machine operators stand upon a floor which is cantilevered over the inertia block and are not inconvenienced by the movement of the the hammer.

By making the pits larger than the contained inertia blocks, good access to all steel springs is provided so that they can be replaced in the rare event that breakage occurs. Because of the very short deflection experienced, the

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Large Pennsylvania coal processing plant chooses Hot-Dip Galvanized Grating for their catwalks and stairs. Constantly exposed to industrial atmosphere, these steel items would soon rust and become unsafe if not protected. After all other coatings had been carefully studied, Hot-Dip Galvanizing was chosen. Here's why: With Hot-Dip Galvanizing you get the thickest, most uniform coating with no open pores to let rust begin—thus costly maintenance is reduced to a minimum and necessity for replacement is eliminated. The original cost of Hot-Dip Galvanizing is economical too.

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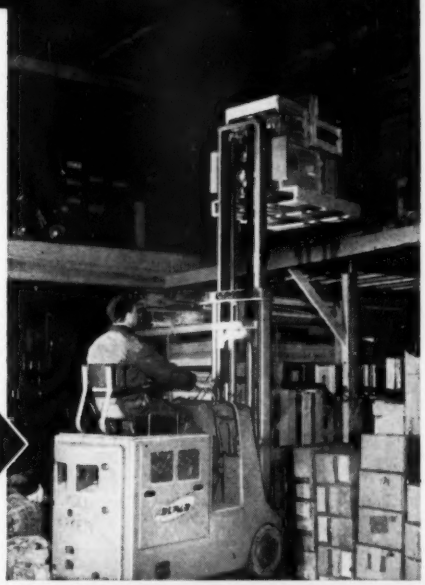
SAVES TIME

Grocery chain uses ELPAR fork truck to move 2,000 cases of food from boxcar to their warehouse. Job formerly took 20 man-hours. Truck now does it in 12—*60% Faster!*



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SAVES LABOR

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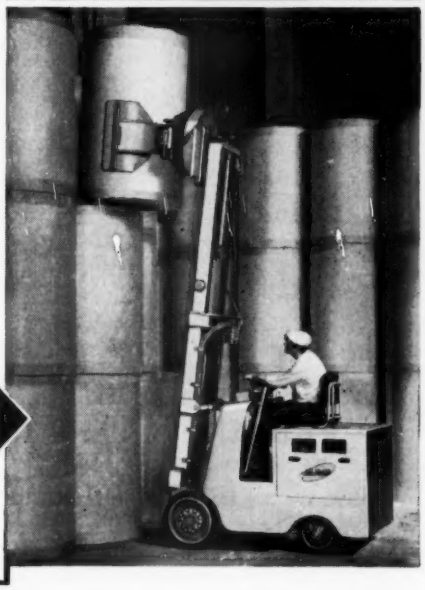

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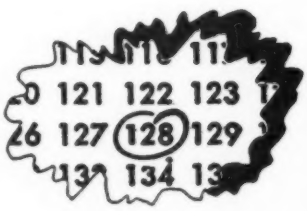


springs are practically indestructible.

A distinct advantage of this method of mounting machines is the excellent facility for keeping them in plumb. Usually, under continued pounding, the foundations of this equipment will shift out of plumb. This causes erratic work and can pulverize wearing timbers, damage machine bases, etc. With the floating foundation, the machine can be kept in perfect plumb by simply adjusting the leveling jacks which are located at each spring mounting.

Coated Abrasives

(Continued from page 113)

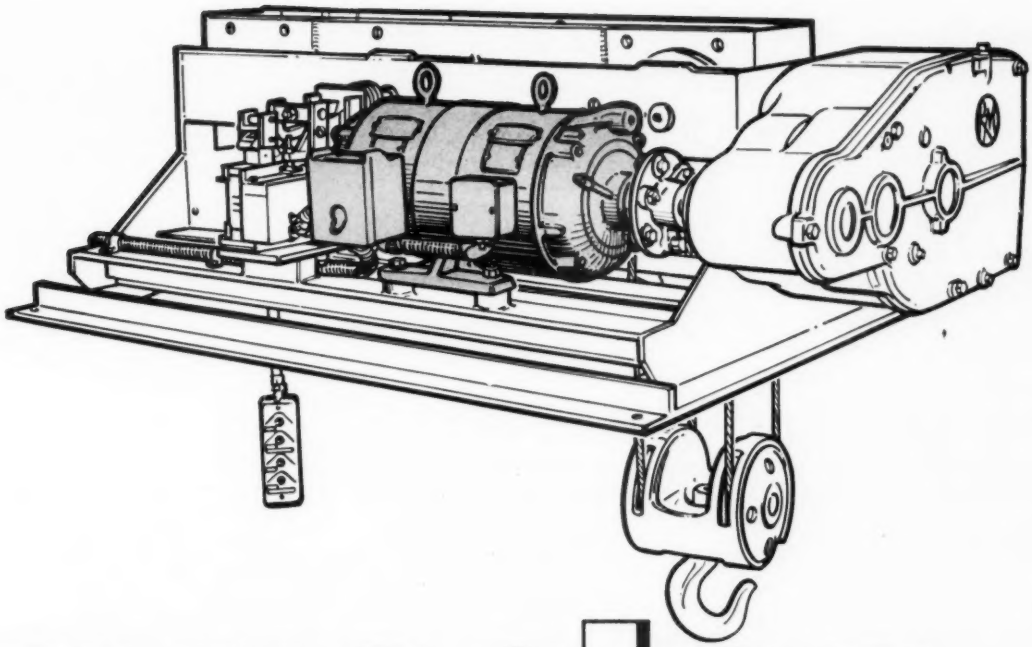
extent for contour polishing. Here a flexible belt is used over a soft contact wheel. This combination allows the belt to conform to the shape of the part. However, only shallow contour grinding can be done on a belt which wraps around its contact wheel because the belt will not stretch sufficiently to allow deep part penetration.

Special machines, Fig. 8, on which the belt does not wrap around the contact wheel are used for deep contour polishing. On these machines the belt is not required to stretch excessively and consequently the contact wheel can be shaped to nearly any practical contour.

Special adapters and fixtures are available that will transform backstand idlers to semiautomatic machines. However, automatic polishing with coated abrasive belts has advanced to a point where this method of finishing can be used for any symmetrical product on a production basis, and in standard, available machines. Centerless belt grinders have been developed that will take off more than 1 lb. of stock per minute from cylindrical stock material and leave a 16 micro inch finish at a tolerance of ± 0.001 in. on a 2 in. diameter tube. Automatic sheet polishers feed and polish sheet metal 48 in. wide at 50 ft per minute.

One of the most unusual applications which demonstrates the flexibility and versatility of the coated abrasive belt is the machine designed to grind and polish turbine blades and buckets for jet aircraft engines. These grinders contain a profile mechanism that directs the belt back-up head to follow precisely and automatically the shape of the part being ground.

Research projects in coated abrasive manufacture and application are probing into every field of metal working production. Recently the coated abrasive belt method of sharpening tungsten carbide tipped tools has been introduced to reduce the cost of the process by eliminating or reducing the need for diamond wheels.



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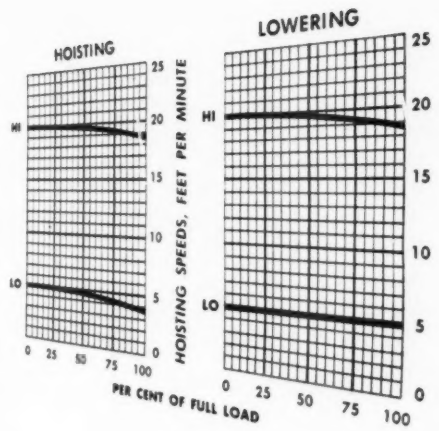

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Have representative call. ☐

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Plant Engineering

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How Caterpillar Tractor Solved Storage Area Re-Surfacing

(Continued from page 99)

if we were to remove and replace the slab; it does not interfere with existing drainage; it is easy to patch; and it provides quiet equipment operation.

"Its bearing capacity has been proved very good, no rutting having occurred even with the great weights to which it is subjected.

"The matter of feather edging is very important. It can be thinned right down to a feather edge adjoining railroad tracks, at doors, or any other obstructions, without having to chip out any concrete to give it a foothold.

"We received the finest cooperation from the installing crew. When we had to get one some of it before it was dry enough, any damage was corrected as long as the crew was on the job."

Field engineer Donald Emser, remarked that Permaflex makes a nice smooth surface for our small wheeled rubber tired lift trucks. Because of its smooth surface, our trucks can make more trips in a day. We feel that truck maintenance has lessened since the surface has been made smooth but cannot prove whether or not this has been due to the new surfacing material.

"Another point of importance is in connection with our use of salt on the slabs in winter to keep them free from ice. When used on the concrete surface, it caused heavy scaling of the slab. Since having the Permaflex surface, we have had no scaling or other deterioration of the surface due to salt."

In response to a question as to what the company thinks of the material, W. H. Zurhorst, plant engineering, said: "It has proved an economical means of resurfacing our concrete storage areas. The cost of the three applications varied somewhat, due to labor conditions during the three years and to the amount of detail involved, such as hand shaping, etc., ranging from 20 cents to 30 cents per sq ft. We have some plans under consideration now for a further use of the material. We will definitely use it at any time in the future when our storage yards need resurfacing."

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Powered Adjustable Ramp

(Continued from page 122)

5. Designed for easy relocation during plant changes and expansion.

6. Enclosed lubricated wearing surfaces for protection against dirt.

7. Engineered against dependence on a central air supply if shipping or receiving departments work overtime.

8. Layover arms or a lip which is heavy enough for service required, reaching out at least 12 in. Layover arms must have ample bearing on the truck bed to minimize pressure and must be rounded on the bottom to prevent scuffing.

9. Equipped with bridge plates which are heavy, not less than 12 in. effective length, crowned and beveled, and in two sections to compensate for trucks out of level in a horizontal plane.

10. So engineered that the deck will not drop if the vehicle pills out unexpectedly.

11. A minimum of moving parts; sealed units wherever feasible, to discourage tampering; ample push-button controls clearly marked to insure against errors by operators.

12. Critical clearance (outside edge to outside edge of layover arms) not to exceed 6 ft (maximum allowable width of trucks or trailers is 8 ft, and the usual inside door opening is approximately 7 ft).

It is a simple matter to review conditions in a given plant and make

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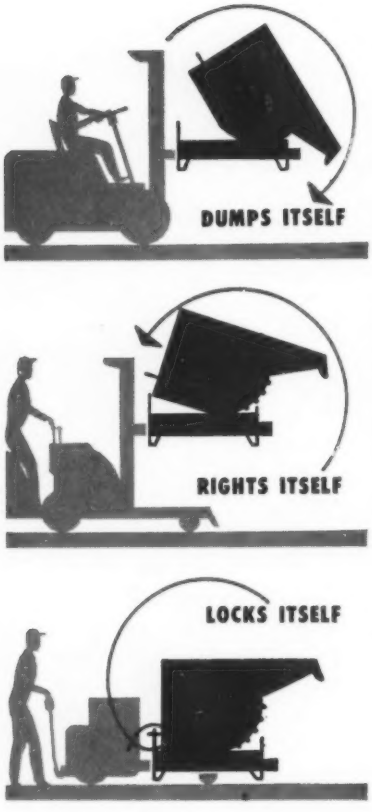

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a cost analysis of the load transfer cost in and out of a vehicle. To accomplish this, a comparison should be developed of the cost of transfer between vehicles and docks vs the cost of handling with the same equipment on unobstructed floor space.

Rotary Pumps . . . Part I

(Continued from page 90)

through. If no clearance existed, this quantity, called "theoretical capacity," would be dependent only on the speed and the physical dimensions of the pumping elements.

Clearances, however, do exist, with the results that whenever a pressure differential occurs, there will always be internal leakage from the outlet side to the inlet side. This leakage, commonly known as "slip" may be relatively large or small depending on the type of pump, the amount of clearance, the viscosity of the fluid handled, and the differential between outlet and inlet pressures. For any given set of conditions it is not usually affected by speed. The delivered or net capacity, therefore, is the theoretical capacity less the slippage.

The theoretical capacity of any pump can readily be calculated providing all the essential dimensions are known. Slip can likewise be calculated but is usually based on empirical values developed as a result of tests. This data is a part of the stock in trade of every pump manufacturer, and capacities can be accurately predicted for any given set of conditions.

Coal Driven Power Stations

(Continued fom page 53)

differential equation which approximates the behavior of the reaction has been set up, but its solution is possible only in the simplest cases.

It is therefore proposed to make the reaction vessel in the form of a cylinder, with perforated walls to allow combustion gases to escape. A concentric inner cylinder, also perforated, serves to introduce the oxygen, while the fuel elements are placed between the two cylinders.

The necessary presence of end plates poses a difficult but not insoluble mathematical problem.

It is likely that these will be easier to manufacture than in the case of fission reactors. Various lattices have been calculated, and it appears that the simplest of all—close packing of equal spheres—is likely to be satisfactory. Computations are in progress to determine the optimum size of the spheres and the required tolerances.

Pure oxygen is ideal, but costly;

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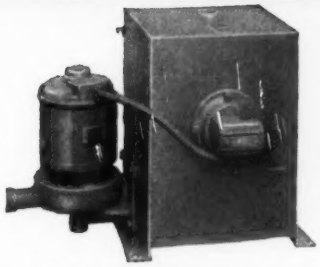
OPERATING COSTS? Less, too, because these compact pumps use new low horsepower per EDR.

INSTALLATION COSTS? Way down. No special wiring needed. No bars or bed plates. Low return line connections.

ORIGINAL COSTS? Lower than ever before! For all the facts on this re-designed and expanded Dunham line of condensate pumps, just clip and mail the coupon.



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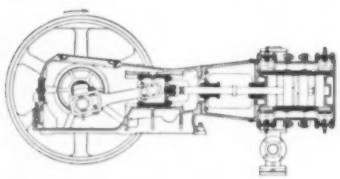

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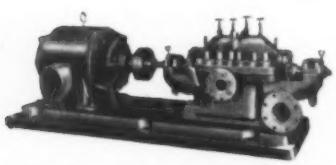

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thus it is proposed to use air in the first place. However it must be remembered that air contains 78 per cent of nitrogen. If even a fraction of that combined with the carbon of the coal to form the highly toxic gas cyanogene this would constitute a grave health hazard.

To start the reaction one requires a fairly high temperature of about 988 F; this is most easily achieved by passing an electric current between the inner and outer cylinder. Once the reaction is started its rate can be controlled by adjusting the rate at which oxygen is admitted; this is almost as simple as the use of control rods in a conventional fission reactor.

The walls of the reactor must withstand a temperature of well over 1000 F in the presence of oxygen, nitrogen, carbon monoxide and dioxide, as well as small amounts of sulphur dioxide and other impurities, some still unknown. Niobium with a thin lining of nickel might be a possibility, but probably solid nickel will have to be used.

Waste Products a Health Hazard

The main health hazard is attached to the gaseous waste products. They contain not only carbon monoxide and sulphur dioxide (both highly toxic) but also a number of carcinogenic compounds such as phenanthrene and others. To discharge them into the air is impossible; it would cause the tolerance level to be exceeded for several miles around the reactor.

It is therefore necessary to collect the gaseous waste in suitable containers, pending chemical detoxification. Alternatively, the waste might be mixed with hydrogen and pumped into large balloons which are subsequently released.

Solid waste products will have to be removed with conventional remote handling equipment, at frequent intervals, and could be taken out to sea and dumped.

There is a possibility that the oxygen supply might get out of control; this would lead to melting of the entire reactor and the liberation of vast amounts of toxic gases. Here is a grave argument against the use of coal and in favor of fission reactors which have proved their complete safety over a period of several thousand years. It will probably take decades before a control system of sufficient reliability can be evolved to allay the fears of those to whom the safety of our people is entrusted. *From an article by O. R. Frisch, Jacksonian Professor of Natural Philosophy, University of Cambridge, published in the Bulletin of the Atomic Scientists, Chicago, Illinois.*

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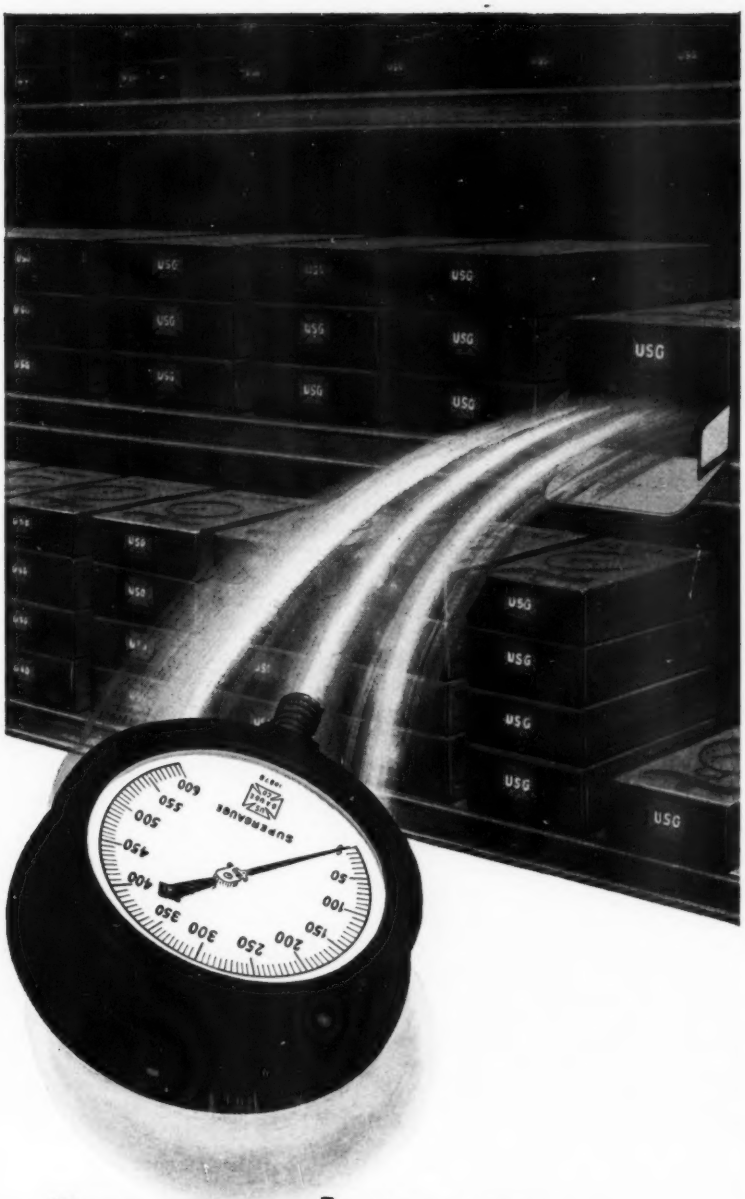

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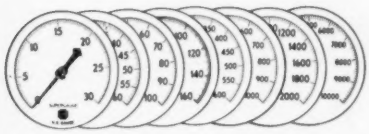
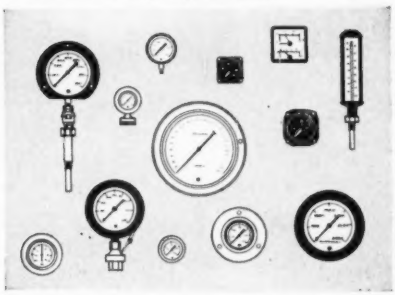
For over 50 years USG has been designing and producing gauges for more original equipment manufacturers than any other instrument company in the world.

Many of USG's "special" designs have become standard stock items in the industry. Many others that are "standard stock" at USG require expensive special production with other instrument manufacturers.



To meet the special gauge requirements of industry economically, USG maintains—in addition to its huge stocks of standard gauges—the world's largest inventory of gauge components to meet any pressure sensing and actuating need.

To assure higher quality gauges with enduring accuracy, USG maintains the most rigid quality control system in the industry. This rigid inspection system is supported by a Standards Laboratory with masters measuring from low vacuums to super pressures.



USG's wide experience in all pressure sensing and actuating applications, plus its economically integrated facilities for large volume, quality controlled production, permit a better gauge—with enduring accuracy—*in every competitive price class.*

From stock to you...

Fast!

In addition to the well stocked shelves of your USG Distributor, USG stocks over 200,000 gauges in a variety of types, sizes and ranges to meet every industry need.

Your USG Distributor has on his shelves, or can get for you fast, any quantity of gauges you want for any application. See your USG Distributor for all your gauge requirements.

UNITED STATES GAUGE *Gauge Headquarters* FOR OVER 50 YEARS

United States Gauge, Divison of American Machine and Metals, Inc., Sellersville, Penna.

UNITED STATES GAUGE

For more facts circle 637 on Reply Card

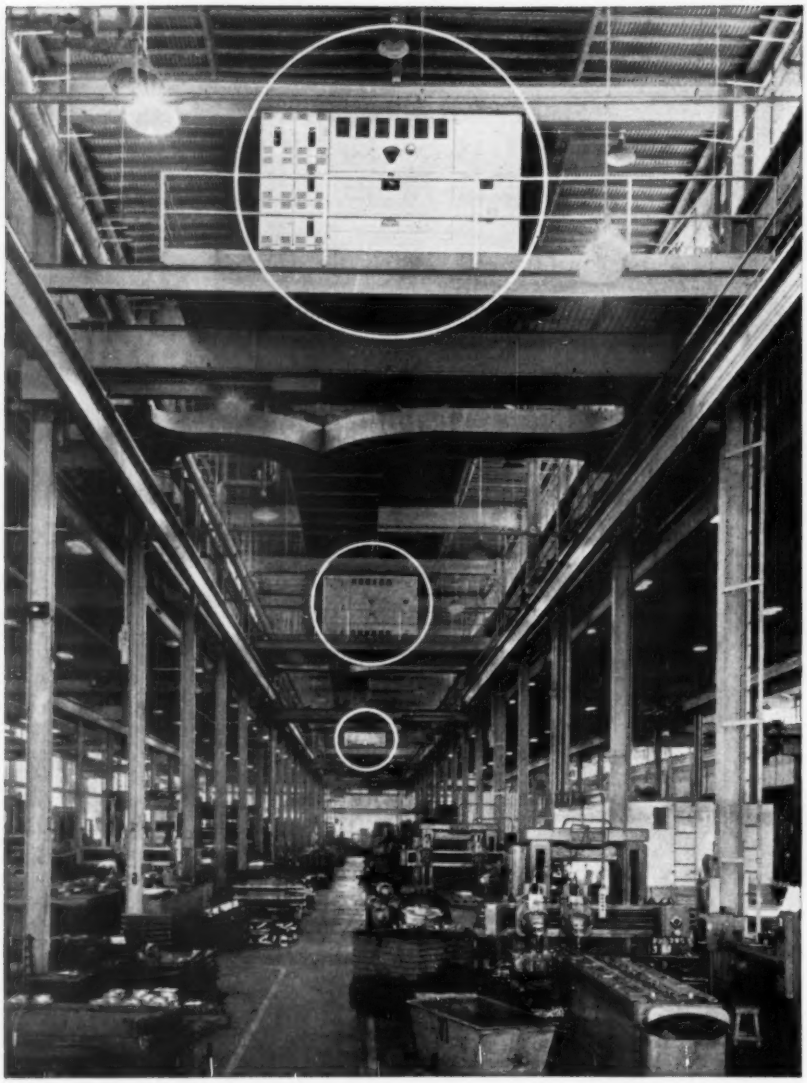
This is how

THE GOSS PRINTING PRESS CO., Chicago obtains

efficient distribution

of electric power with high voltage feeders to load centers, and also

saves floor space



This was accomplished with

SORGEL Dry-Type Transformers,

compactly incorporated into substations, all self-contained, safely enclosed in steel, complete with primary switchgear and secondary circuit breakers, and installed above floor level.

The installation consists of five 500 Kva and two 300 Kva, 3-phase, 4160 volt to 480 volt substations for power, and 13 dry-type transformers, sizes 10 to 50 Kva, 3-phase, 480 volt to 120/208 volt for lighting and portable equipment.

This saved The Goss Printing Press Co. thousands of dollars over a low voltage distribution system, and provided them with the efficiency that only a high voltage distribution can provide.

Again the ingenuity of an owner, his architects, and consulting engineers, combined with SORGEL expert engineering, resulted in a most modern, flexible, space-saving and efficient electric distribution system.

By using SORGEL dry-type transformers in substations, all vaults have been eliminated, and by installing the substations overhead, more floor area was made available for production.

Architects — Olsen & Urbain
Engineers — Neiler, Rich & Bladen
Electrical Contractor — The Edward Electric Co.

Sales Engineers in Principal Cities

SORGEL ELECTRIC CO., 844 West National Ave., Milwaukee 4, Wis.

40 years experience in the development, manufacturing and application of transformers.

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BULLETINS

(Begins on page 21)

155 **Table-Type Blast Cleaner**—Bulletin 944 describes a table-type airless blasting machine which requires no pit for the abrasive hopper. Describes jobs it can do and tells mechanical and construction advantages. American Wheelabrator & Equipment Corp.

MECHANICAL POWER TRANSMISSION

156 **Industrial Equipment**—Catalog 950 is a 340-pp ordering guide on this manufacturer's standard products, including chains and sprockets for conveying, elevating and power transmission. Tables of pre-engineered drives aid in selection of standard roller chain drives and silent chain drives. Complete listings are given of stock and made-to-order chains and sprockets. A section on conveyor components gives a comprehensive listing of products for screw conveyors, belt conveyors, oscillating conveyors and bucket elevators. Stock readily identified. Capacity charts and dimension tables included. Available to qualified plant engineers, please state your job title when requesting this catalog. Link-Belt Co.

157 **Flexible Shafting**—Engineering data on flexible shafting for power drives and for remote control is provided in 12-pp Bulletin 525. Simplicity of installation, safety and other advantages of this shafting are given; typical applications are listed and pictured. Bulletin defines shaft terminology, describes types of cores and tells how to select them. Also provides data on terminals, core fittings and casing ferrules. Stow Mfg. Co.

158 **Power Transmission Products**—A line of mechanical power transmission products is presented in Catalog B 20-53, 8 pp. Describes and illustrates silent chain, roller chain and company's Hy-Vo drives; sprockets, cable chains, drive shafts, couplings and clutches. New information is included on Taper-Lock sprockets, cam clutches and torque limiting clutches. Morse Chain Co.

HEATING, VENTILATING AND AIR CONDITIONING

163 **Warm-Air Heaters**—Company's Paraflo warm-air, oil or gas space heaters for commercial and industrial use are described in Bulletin 552. The 8 pp booklet illustrates design and construction features, shows application and installation information and gives engineering data. Dravo Corp.

164 **Air Purification**—Industrial installations of Flexaust hose and Portovent duct for moving air, dust, fumes, gases, and materials described in Bulletin 40. Illustrates many applications. The Flexaust Co.

165 **Air Conditioners** — Bulletin DS-362, 24 pp, presents information on improved self-contained air conditioning units with capacities from 3 to 20 tons. Describes units of 3, 5, and 7½-ton capacity now available with hermetic compressor, also larger units available with water or evaporative type condensers. Line diagrams, wiring diagrams, capacity tables are provided. The Trane Co.

SAFETY

166 **Rules for Solvent Safety**—"An Approach to Solvent Safety" is a non-proprietary discussion of the problem of finding the right solvent for the job. Shows how this is capable of easy analysis and control by application of seven rules of measurement to solvent qualities. John B. Moore Corp.

167 **Flame Rectifier Units** — Eight-pp Bulletin 9604 describes new miniature flame rod assemblies, photocell units, pilots and other components used in company's Protectoglo combustion safeguard systems for industrial oil and gas burners. Also provides specifications. Minneapolis-Honeywell Regulator Co.

168 **Frangible Discs**—This series of catalog sheets covers the variety of uses offered in the protection of pressure systems by frangible discs (individually-designed pressure relieving device used to protect equipment or process systems). Diagrams and tables covering design and dimensions of frangible discs make this a veritable handbook on pressure system protection. Frangible Discs, Inc.

AMONG THIS MONTH'S NEW LITERATURE OF MERIT . . .

160 **Multi-V Belt Handbook**—Featuring a guide to the design of standard and high capacity drives, this 76-pp engineering manual provides new rating tables which approximate actual operating conditions. They suggest design or re-design of V-belt drives at lower cost by reducing number of belts needed and indicating potential use of lower cost sheaves. Tables cover speed ratings from 100 to 6000 fpm. Other subjects are selection, installation and care of V-belt drives, principles of design, pre-engineered drives. A multi-V-belt drive calculation sheet is also provided. Simplified tables cover take-up allowance, belt correction factor etc. Book is available to qualified plant engineers, please state your job title. The B. F. Goodrich Co.

161 **Bearing Lubrication**—Vol. XL, No. 10 of this company's Lubrication magazine provides an excellent 12-pp article on industrial bearing lubrication. Illustrated with photos and drawings, text covers such subjects as bearing design; bearing surfaces; bearing overhaul; aspects of lubrication, including factors involved in choice of turbine oils and diesel lubricants, and the effects of moisture; and the life expectancy of bearing lubricants. The special requirements of porous bearings are also discussed. The Texas Co.

162 **Sash Maintenance**—Plant engineers concerned with sash maintenance problems will find this 16-pp brochure an absorbing reference text on caulking and glazing, painting rusted metal, sill restoration. Illustrated by photos, drawings and diagrams, booklet explores such subjects as mastic glazing versus putty, how windows are installed, how sash deteriorates, how sash troubles can be diagnosed and eliminated. The Tremco Mfg. Co.

169 **Hard-Facing Guide**—A comprehensive and analytical study of hard-facing, its application and wear resisting qualities, is contained in this 72-pp pocket-size brochure. Besides providing latest data and instructions on hard-facing, this booklet gives information on company's own line of hard-facing metals. An application index recommends specific rods for 1000 pieces of equipment subject to impact and abrasion. A technical data section covers such subjects as what metals can be hard-faced, effect of heat on metals, depositing single narrow heads, hard-facing with moderate build-up. Mir-O-Col Co.

170 **Tools of Automation**—Combining applied engineering, creative thinking, and electric motor drives to provide know-how for automation of single machines or continuous processes is the subject of this 12-pp booklet. Illustrations and sketches accompany each section. Individual booklet divisions illustrate the combination of motors and creative engineering in choosing right motor for the job; adjustable-speed drives as a tool of automation; and electronic controls and regulators that provide precise, accurate motor drive operation. Reliance Electric and Engineering Co.

171 **Manufacturing Control Aids**—Advantages of IBM methods are described in this 28-pp booklet. Tells how IBM cards punched with basic information actuate electronic and electric equipment to prepare wide variety of useful reports, including forecasting statistics; records of specifications that make it possible to calculate material, facility, and manpower requirements; schedules and control documents for directing the manufacturing program; and progress reports, machine load reports. International Business Machines Corp.

To order these bulletins circle item numbers on the handy Reader Service Cards provided on the facing page.

MATERIALS HANDLING

172 **Hydraulic Lifters**—Standard Products Bulletin 54, 12 pp, features new Worklifters, portable, battery-operated, hydraulic lifters, available in a variety of special purpose designs, in a 1000 lb capacity, and with lifts up to 80 in. Also describes company's Shoplifters with both hand powered and electric hoisting units, and with accessories for die handling, or designed for handling drums. Economy Engineering Co.

173 **Preventive Maintenance for Trucks**—This 6-pp article details requirements of a preventive maintenance program for industrial vehicles. Explaining the importance of good lubricants and correct lubrication, and enumerating the principal causes of equipment failure and breakdown, the booklet contains several suggested maintenance forms. Also emphasizes importance of record-keeping and employee attitude. The Elwell-Parker Electric Co.

174 **Preventive Maintenance Chart** — This preventive maintenance chart for electric fork trucks shows the proper steps to be taken for the daily, weekly and monthly inspections. Describes a preventive maintenance program for trouble-free truck service. Each chart covers eight weeks of truck operation, and illustrates principal maintenance locations. Lewis-Shepard Products, Inc.

175 **For Handling Bulk Materials**—Various types of equipment and structures for handling coal, ore and other bulk materials are described in Bulletin 225, 32 pp. Discusses mechanical, electrical and structural features of such equipment as ore and coal bridges, man trolley unloaders, rope-operated towers, replacement trolleys, hydraulic buffers and rail clamps. Dravo Corp.

176 **Hydraulic Cranes**—This pocket-sized pamphlet, S-30-H, describes company's truck-mounted, all-hydraulic Hydrocrane. Explaining why 38.6 percent of all Hydrocranes sold are repeat orders, the text points to such features as precision hydraulic control, telescoping boom, fast job-to-job travel, self-powered crane, and quick conversion to use with various attachments. Bucyrus-Erie Co.

177 **Overhead Handling Equipment**—Eight-pp Bulletin PU-50-G, on overhead handling equipment, illustrates pullers, hand chain hoists, trolleys, electric chain hoists, electric rope hoists, and cranes. Describes equipment and gives specifications. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

178 **Engineered Conveyors**—Catalog 370, 32 pp, covers manufacturers three featured products: the Magnavator, an automatic elevator for handling small parts magnetically; the Tube-veyor, an enclosed conveyor for bulk materials; and the Chip-a-way, a piano hinge steel belt conveyor elevator. Also presents bucket elevators, and screw, belt, vibrating and pneumatic conveyors and other custom built equipment. Prab Conveyors, Inc.

LUBRICANTS, LUBRICATION

179 **Lube Service Recommendations**—Application and performance information on a line of industrial lubricants is given in this folder. Covers both non-graphited lubricants and those containing graphite. Included among non-graphited products listed are synthetic zinc oxide lubricants, as well as greases and straight mineral oil types. Gredag Inc.

180 **Centralized Lubrication** — Pocket-sized 24-pp, Form 34-22, called "Ask Anyone in Industry" describes in comic-book form the hazards and inefficiency inherent in conventional lubrication practice and promotes use of centralized lubrication—in the form of Alemite Accumeter measuring fittings. Shows

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By placing men at the proper height to conveniently do their work, men develop increased speed and efficiency with greater safety. Baker Adjustable Steel Scaffolds, complete with metal-bound platform, provide large working area and have no loose parts to cause needless delays.

Platform support trusses lock to upright ladder sections with *both* automatic and manual safety locks . . . cannot be rocked or sprung loose. Locking casters lock both the wheel and the swivel for added safety.

The absence of "X" bracing permits the use of *Baker Scaffolds* in occupied areas . . . they span machinery, equipment and stockpiles.

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Gentlemen:
Please send information on Baker Scaffolds without obligation.

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Company_____

Address_____

City_____ State_____

For more facts circle 639 on Reply Card

BULLETINS

(Begins on page 21)

how these are connected by tubing to a lubrication pump controlled by an automatic timer. Alemite Div., Stewart-Warner Corp.

181 Heavy Oil Purification—"Centrifuges for Oil Processing," is a 16-pp booklet giving performance data on three Westfalia oil separators for purifying fuel and lube oils, with special emphasis on No. 6 residual oil. Also describes a new hydraulic lifter and exchangeable bowl liners. Centrico Inc.

OTHER EQUIPMENT

182 Concrete Storage Bins—This 29-pp brochure on concrete stave storage bins contains table of cubic foot weights of flowable materials; bin capacities per foot of height; description of wall construction; information on super-concrete stave test data; detail drawings of stave, rods, and lugs; specifications and drawings of concrete roof. Other material provided deals with foundation curb on common roof of adjacent bins for supporting superstructures; access openings, elevated floor and overflow partition; wall openings including gates. Available to qualified plant engineers; please state your title. The Neff & Fry Co.

183 Data on Epoxy Resins—Three new 6-pp technical bulletins contain detailed descriptions of Bakelite C-8 epoxy resins which, with proper hardeners, can be used in tooling, casting, laminating, potting, encapsulating, embedding and adhesive applications. The brochures give physical properties of individual resins and hardeners, together with physical, chemical, electrical properties of combinations. Bakelite Co., Div., Union Carbide and Carbon Corp.

184 For Industrial Filtration—This 8-pp illustrated bulletin on Delpark automatic self-cleaning filters discusses their use as applied to coolants, paint spray water, air conditioning wash water, quenching oils and other applications. Illustrated with photos of several installations, also includes dimensional data. Industrial Filtration Co.

185 Industrial Products—This 48-pp catalog illustrates representative parts produced by eleven divisions of company and details physical properties or characteristics. Breakdown is by type of product, and catalog contains sections on ferrous castings, non-ferrous castings, bearing materials, sintered metals, steel forgings, welding products, air compressors, industrial pumps, dredge pumps, and other products. American Brake Shoe Co.

186 25 Years of Construction—Illustrated in this 20-pp booklet are some of the many construction projects handled by this company since 1929. They show the varied types of jobs undertaken and include industrial plants, power plants, warehouses, institutional buildings, others. F. H. McGraw & Co.

187 Electroplating Processes — Descriptions and key characteristics of 16 electroplating processes are given in Bulletin P-100. These include seven nickel plating, three zinc, one cadmium, one copper with and without periodic reverse current, two silver, one lead and one bright ternary alloy plating process. Included in bulletin is a list of 10 services available to plant engineers, such as provisions made to train platers. Hanson-Van Winkle-Munning Co.

188 Organized Training Programs—Industrial training problems are discussed in "The Training Job and How to Meet It." This 24-pp illustrated booklet presents the correspondence approach to industrial training and appraises the various ways that correspondence education can be adapted to meet training problems on either an individual or group basis. International Correspondence Schools.

189 On Cathodic Protection—The "whys" and "hows" of cathodic protection are covered in 12-pp Catalog Section S-6500, a reference work on mitigation of corrosion of underground and submerged metal structures by an impressed current cathodic protection system using graphite anodes. Contains information on the cost of corrosion; where and when protection should be applied. National Carbon Co., Div., Union Carbide and Carbon Corp.

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IDEAL PREVENTIVE MAINTENANCE

Keeps motors running like new... The easy, fast way to restore commutators and slip rings — WITHOUT DISMANTLING! — Substitutes low-cost prevention and correction for high-cost repair and rebuilding — COSTS LITTLE, SAVES A LOT.

RESURFACERS
Refinish commutators and rings to like-new condition even when ridged, scored or burned.

MICA UNDERCUTTERS
Stop sparking — help commutation — prolong brush life. For all sizes of commutators.

PRECISION GRINDERS
For more than surface smoothing—under machine's own power. Accurate to .001".

FLEXIBLE ABRASIVE
Cleans and burnishes commutators. Non-dusting. Complete size range.

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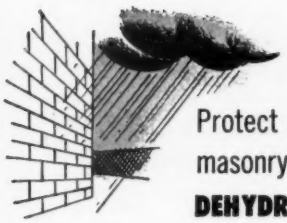

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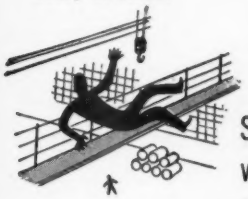

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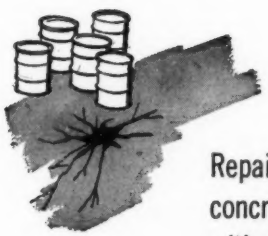

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DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 205-206.

INSTRUMENTS, CONTROLS

201 Control Centers—Advantages of control centers and their versatility are discussed in this 28-pp booklet. Illustrated with photos and full-colored drawing, booklet shows 10 typical installations of control centers and explains how this equipment can lower costs. Design and construction features are explained, and three basic NEMA types of construction described. Electrical and mechanical construction details are shown, typical specifications provided and handy space requirement tables included. The Clark Controller Co.

202 Recording, Controlling Instruments—Circular M-2-A, 48 pp, illustrates, discusses manufacturer's entire line of mechanical industrial instruments, including fixed stem and distant reading dial thermometers, temperature and pressure recorders, controllers, diaphragm motor valves. A listing of 9-, 10- and 12-in. circular recorder charts is also available. Weston Electrical Instrument Corp.

203 Flow Meters—Catalog 2320, 58 pp, fully illustrated, describes all types of manufacturer's flow meters, including indicating, recording, integrating and controlling instruments of evenly graduated and square root types, as well as area meters and differential converters. Includes tables on flow approximations, installation information, factors necessary to determine if fluid to be measured can be properly handled. Industrial Div., Minneapolis-Honeywell Regulator Co.

204 For Liquids Worth Storing—Bulletin 6405 offers an illustrated discussion of company's self-contained gages for liquid level applications, covering both direct- and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp.

205 Electronic Controls—Eight-pp Catalog F 6166 describes flexibility of an electronic control system for heating, ventilating and air conditioning. Describes temperature controls, control panel, sensing elements, as well as the ultra-sensitive micro relay which simplifies the amplifier. Barber-Colman Co.

206 Handbook on Automatic Controls—Catalog 700 provides 45 pp of ordering and application data on automatic controls with mercury contact switches. Covers control equipment for temperature pressure-low water, liquid level bottles; transformer-relays, valves. The Mercoid Corp.

207 Wide Range Regulator — Featured in Bulletin 316 is an expansion stem type temperature regulator operated by water or compressed air. Explains how regulator works. The Powers Regulator Co.

208 Orifice Meters—Bulletin 1050 Rev. 1, 28 pp, shows how manufacturer's orifice meters are made, how they operate. Tables give capacity data, and there are descriptions of manifold arrangements and differential ranges, along with illustrations of various parts. Sketches show how meters are used. Rockwell Mfg. Co.

209 For Efficient Air Control — Sectional Catalog 20 contains a working file of data on manufacturer's air control products. In it, sections are devoted to couplers, blowguns, hose and fittings; air ejection sets; pneumatic press controls; air cylinders and operating valves; four-way valves; and miscellaneous air control equipment. Includes current price list. A. Schrader's Son.

210 Ideas on Push-Pull Controls—Included in this "Idea File" are answers to a plant engineer's questions on the use of push-pull controls. A general information booklet discusses remote control applications, explains construction and operation of company's Tru-Lay controls. Separate bulletins are devoted to standard assemblies, bracket-type head controls, micro controls and hand-operated controls. Automotive and Aircraft Div., American Chain & Cable Co., Inc.

LUBRICANTS, LUBRICATION

211 Centralized Lubrication — Featuring selection charts covering low and high pressure fluid lubrication systems for a wide range of industries and providing an explanation of operating principles of various types of systems, 24-pp Catalog 80 covers company's lubricant application equipment. Describes and pictures lubricant pumps, transfer and dispensing equipment. Lincoln Engineering Co.

212 Automatic Lubrication — Sixteen-pp Catalog L-52 describes force feed lubricators for all types of machinery. Illustrated, gives full design and construction details on company's open and enclosed type lubricators, available in capacities from 2 to 32 pints with 1 to 24 feeds per unit. Hills-McCanna Co.

213 Proper Lubrication—Presenting proper lubrication as the life blood of all machinery, 36-pp Lubriplate Data Book 54-1 is a helpful treatise on modern lubrication practice. Gives product data on both oil type lubricants and greases and discusses choice of lubricants for use in applications involving heavy loads, high speeds, extreme temperatures, water conditions and other metal working. Provides tables of specific recommendations for various classes of equipment used in chemical processing, metalworking, other industries. Lubriplate Div., Fiske Brothers Refining Co.

214 Multi-Purpose Grease — This bulletin describes Gargoyle Grease BRB No. 1, intended to provide correct lubrication for practically all normally loaded anti-friction and plain bearings. Tells how it resists leakage, protects against rust and corrosion. Socony-Vacuum Oil Co.

215 Lubricant Recommendations—Featured in this 20-pp booklet are lubricant recommendation charts covering a wide range of lubricating applications and showing which of company's product is best suited for each. Also provided are data on metal working lubricants and cable pulling compounds. Includes product listing. Adam Cook's Sons, Inc.

MATERIALS HANDLING

216 Overhead Handling Equipment—Booklet 2008-K, 12 pp, is a newly revised edition of this company's engineering and application data booklet covering overhead materials handling equipment. Describes and illustrates track drives, cranes, electrification, buckets, grabs. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

217 Engineered Monorail Applications—A file of application literature is announced as the beginning of a new service offered potential users of monorail equipment. Includes a technical booklet on automatic dispatch systems and an equipment bulletin in addition to several case studies of installations. As they are completed new groups of case studies will be sent to holders of file. Available to qualified plant engineers. The American MonoRail Co.

218 Locomotive Cranes—Catalog 84, 16 pp, stresses advantage of the torque control unit used in company's cranes and features illustrations of the mechanism and converter unit. Describes in detail the sealed, anti-friction bearings, air controls, brake, limit switch and other components. Orton Crane & Shovel Co.

219 Industrial Shop Cranes — Twelve-pp Bulletin 6-B describes Cranemaster overhead travelling cranes in capacities to 15 tons, spans to 60 ft. Crane bridge, trolley and other components are described in detail and optional equipment listed. Dimensions and specifications for four basic types to suit various building conditions are provided. Abell-Howe Co.

220 Cranes for Big Jobs—A new 1½-yard shovel, 35-ton crane is described in this 6-pp catalog. Action pictures of the machine in quarries and gravel plants are included, along with general specifications. American Hoist & Derrick Co.

221 Grips for Safe Handling — Bulletin 220B, 24 pp, pictures and gives ordering and application information on hooks, tongs, grips, and slings. Covers their use with a wide range of materials, including steel plates, pipe and round bar stock, drums and barrels, coils, cartons, baled material, timbers. Also lists chain pocket wheels and guides. Includes current price sheet. Downs Crane & Hoist Co.

222 Floor Cranes — 1954 models of this manufacturer's hydraulic floor cranes are described and pictured in the 8-pp bulletin. Shows cranes from 1000- to 6000-lb capacities, giving applications and special features of each. Ruger Equipment, Inc.

223 Overhead Cranes — Sixteen-pp Bulletin U-200 presents underhung overhead cranes of the push type, hand geared type and motor driven type. Fully illustrated with photos of cranes and typical installations, book provides application suggestions and full dimensional data. Also covers track hangers, tracks and trolleys. Chicago Tramrail Corp.

224 Tubular Conveyors — Form HC-541 contains about 44-pp of data on tubular conveyors for moving almost any flowable material. Shows basic types of these conveyors, tells what they're designed to do and how they are applied. Lists materials being handled to advantage with them, and discusses benefits. Gives engineering data on these units. Hapman Conveyors, Inc.

225 Conveyor and Elevator Belting Tips—This 32-pp manual on installation, maintenance and care of conveyor and elevator belting, uses photos and drawings to show ways to improve belt service and lengthen belt life. Includes a discussion of belt design, covers, reinforcements and grades. Repair methods, splicing, and fastening are also covered, and there's a table listing common conveyor belt maintenance problems with their causes and remedies. The B. F. Goodrich Co.

226 Oilless Bearings for Conveyors—Technical Catalog 210, 20 pp, gives detailed information for specifying, installing and use of bearings for screw and roller conveyors, together with operating characteristics. The sectionalized catalog provides tabular data and dimensional drawings to facilitate identification of bearings for replacement. Arguto Oilless Bearing Co.

227 Continuous Power Conveyor — Sixteen-pp Catalog A-96 describes a packaged overhead conveyor for light duty applications. This complete basic "package" contains drive unit, take-up, oiler and other items essential for a 50-ft system. Describes power drive unit, track, power chain and other components and discusses lubrication and chain safeguards. Suggested layouts are diagrammed, and some installations of these conveyors are illustrated. Richards-Wilcox Mfg. Co.

228 Engineered Conveyor Systems—Catalog 853, 32 pp, illustrates conveyor systems in use in a wide range of industries showing how they suit handling requirements involved. Roller, wheel, belt, chain, overhead trolley and elevating conveyors are included, also spirals portable power conveyors ball transfers and special equipment. Mathews Conveyer Co.

229 For Better Fork Lift Performance—This folder details nine ways in which LPG and Beam carburetion improve fork lift truck operation. Stresses increased safety, reduced engine wear, lower fuel costs afforded. The Parkdale Co.

230 Fork Truck Efficiency Test—This 8-pp article explains how to tell when fork trucks need corrective measures. Lists equipment and facilities necessary for truck testing, tells how to test traveling efficiency and hoist speed measurements, shows suggested test data forms. Mercury Mfg. Co.

231 Lift Truck Work Kit—A method of predetermining the time necessary for fork

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DATA FILE

(Begins on page 210)

lift trucks to perform specific operations is provided in this work kit, designed to enable plant engineers to apply fork lift truck standard performance data. It can assist in determining efficiency of fork lift trucks now in use as well as for planning for future needs. Includes typical materials handling examples to show technique for application of the data as well as charts providing times for basic truck motion elements. Also includes a quantity of work sheets. The Yale & Towne Mfg. Co.

232 **Manual on Electric Hoists** — Catalog H-46, 40 pp, covers monorail and stationary hoists and car pulleys. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.

233 **Portable Hoists**—Description and specifications of more than 100 types and sizes of portable hoists appear in 8-pp Bulletin CL. They include ratchet, lever hoists in roller and coil-chain models, with capacities from ¾ to 15 tons, standard, specialized spur gear hoists, Quik-Lift electric hoists. Coffing Hoist Co.

234 **Industrial Truck Safety**—This folder, "Send Your Cowboys to School," gives pictorially the do's and don'ts for safe industrial truck operation. The Elwell-Parker Electric Co.

235 **Shovel and Loader**—Described in 12-pp Bulletin 1932 is a hydraulic crown and hoist shovel and loader incorporating mechanical features usually associated with big shovels. Illustrates, gives specifications, application information on both pneumatic traction and crawler traction models. Dempster Bros., Inc.

236 **For Hopper Economy**—"In Dollars and Sense" explains long run economy of company's self-dumping hoppers, showing how they operate and telling how they fit particular plant requirements. Illustrated with photos, gives dimensions, weight of a standard 1-yd model. Roura Iron Works.

237 **Industrial Lifts**—This booklet presents a wide range of elevating equipment designed to step up efficiency and cut handling costs. Covers dock lifts, crossover bridges, sidewalk elevators, service lift. The Wayne Pump Co.

238 **Sheet Lifter**—Operational and design features of company's sheet lifting equipment which contributes toward efficient handling, flexibility and economy are explained in Bulletin S-25, 16-pp. Cullen-Friestedt Co.

239 **Electric Hoist Manual**—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists for low head. Manning, Maxwell & Moore, Inc.

240 **Trolley Hoists**—Bulletin DH-269, 2 pp, describes and pictures ½ to 3 t capacity, army-type trolley hoists, plain or geared, for use where a close, headroom assembly is required. Gives dimensional and capacity data, prices. Wright Hoist Div., American Chain & Cable Co., Inc.

241 **Handling Equipment**—Several of this manufacturers new products are described in this comprehensive 48-pp catalog, including steel boxes with lap joints, a stand and reel for handling steel coils and a new type nesting stacking box. Book presents a wide range of other materials handling equipment—stacking boxes, skid boxes, skids, racks, trucks and trailers. Palmer-Shile Co.

242 **Versatile Palletizing System**—A system of materials storage in which practically anything can be palletized is described in this 16-pp illustrated booklet. Provides check list of points to be considered in selecting a storage system and explains how manufacturer's equipment is designed for adaption to individual plant requirements. More than 25 installations are pictured. Tiering racks, deck, shelving and tiering hardware are shown. The Paltier Corp.

WIRE ROPE, SLINGS

243 **To Keep Wire Rope at Work**—Form 3547 is an 82-pp handbook titled: "Here's How to Keep Your Wire Rope Working," and filled with practical tips on care and use of wire rope. Tells how wire rope is constructed, what types are suited to various jobs, how to install it. Covers such subjects as abrasion, lubrication, avoiding kinks, alignment of sheaves, winding on drums, bending fatigue, wire breaks, when to discard a wire rope. Wire Rope Div., American Chain & Cable Co., Inc.

244 **Sling Handbook and Riggers Manual**—In the sling handbook section of this 48-pp book, 11 sling types are illustrated and their dimensions, weights and safe working loads given. Illustrations of sling uses accompany factual data. Also pictured and detailed are sling fittings. Information on care of slings, data on braided wire fabric and directions on splicing braided wire sling fabric included. The riggers manual gives detailed instruction on splicing, and includes data on efficiencies of wire rope attachments. Union Wire Rope Co.

MECHANICAL POWER TRANSMISSION

245 **Transmission, Control Equipment**—Variable speed transmission and speed control devices are presented in 48-pp Catalog 45. Fully illustrated, provides descriptive and application information, operating principles, dimensional tables. More than 60 photos show use of this power transmission equipment in paper mills, food processing plants, textile plants, others. Lewellen Mfg. Co.

246 **Coupling or Converter**—To promote a better understanding of hydraulic couplings and torque converters, this 32-pp publication tells where couplings or torque converters should be used, and why, furnishing a source of facts on non-technical terminology. Covers meaning of torque and its effect on driving and driven equipment. Twin Disc Clutch Co.

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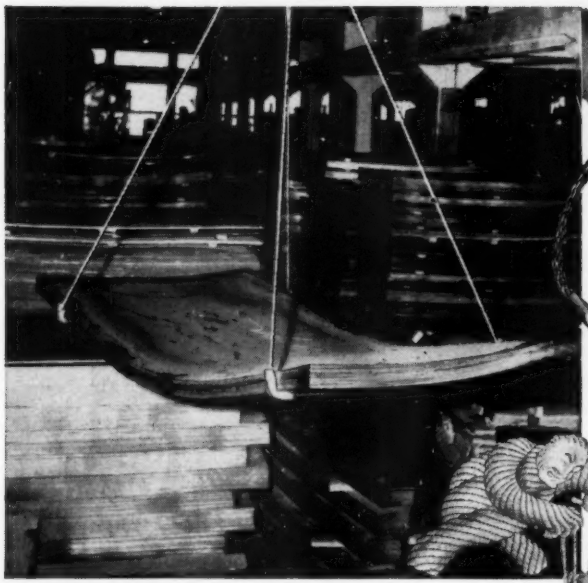

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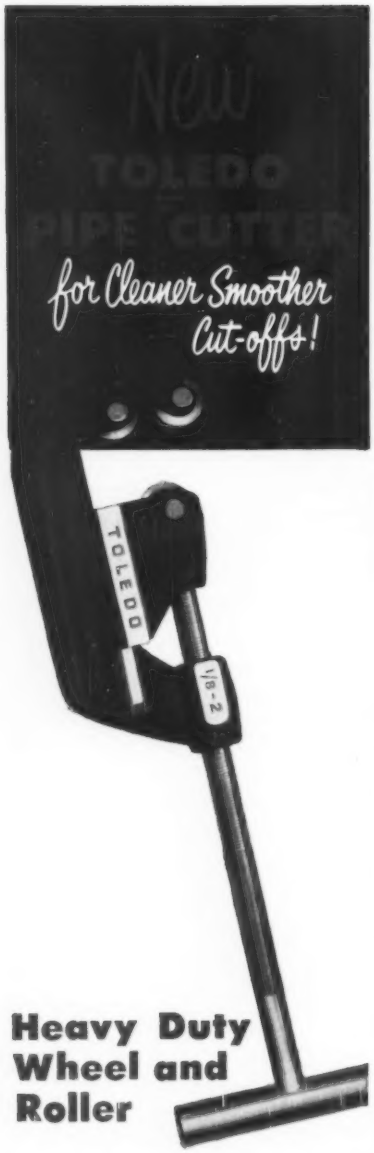

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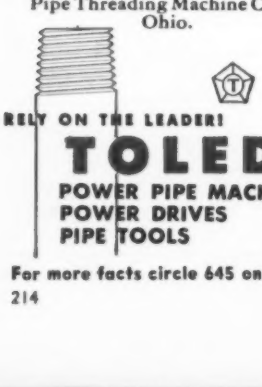

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DATA FILE

(Begins on page 210)

247 Power Transmission Equipment—Form 118, 24 pp, gives descriptive and technical information on variable speed pulleys, wide V-belts, sheaves, motor bases, countershafts, and Select-O-Speed transmissions. Illustrated with photos and dimensional drawings, booklet provides ratings, sizes, application and installation tips. Lovejoy Flexible Coupling Co.

248 Steel Couplings—Bulletin 4100, 32 pp, provides engineering data covering the selection and application of company's standard Steelflex couplings. Large cutaway illustration shows construction features of these couplings which are designed to accommodate parallel and angular mis-alignment and free end float. Photos show industrial installations of these couplings. Book also lists brakewheel, controlled torque, high speed and other couplings for special applications. The Falk Corp.

249 Flexible Couplings — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

250 Conveyor Belting — Folder 54-3, contains a capsule description of construction, types of treated stitched canvas belting for all conveying and elevating applications. Describes company's general conveyor and elevator belt, oil- and acid-resisting belts to handle hot materials to 600 F. Imperial Belting Co.

251 Sprockets, Roller Chain—Bulletin A-624 24 pp, is compiled to provide plant engineers with all data required for selecting and ordering roller chain and sprockets. A page devoted to Taper-Lock sprockets for each size of chain from 40 to 100, giving sectional drawing, dimensions, number of teeth, maximum stock bore available, weights, prices and other data. Another page covers Taper Lock bushings; and full information is given on riveted and cotter-type roller chains. Dodge Mfg. Co.

The two Reader Service Cards on pages 205-206 are easy to use and need no postage. Just circle the item number of catalogs wanted.

252 Improved V-Belts—This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

253 Chain Drives—Catalog 154, 20 pp, explains operating characteristics, service factors of manufacturer's pre-selected drives; how to select the proper drive; lubrication and maintenance. Tables give specifications, prices, hp capacities. The Ramsey Chain Co., Inc.

254 Power Drive Handbook—Catalog 709, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc.

PUMPS, COMPRESSORS

255 Centrifugal Compressors — Twelve-pp Bulletin 109 describes and pictures single-stage centrifugal compressors for delivering large capacities of pulsation-free air or gases. Their functions, applications, ratings, construction features, arrangements, and methods of control are presented. American Blower Corp.

256 Multi-Stage Compressors—Featured in 36-pp Bulletin 116 is a presentation of engi-

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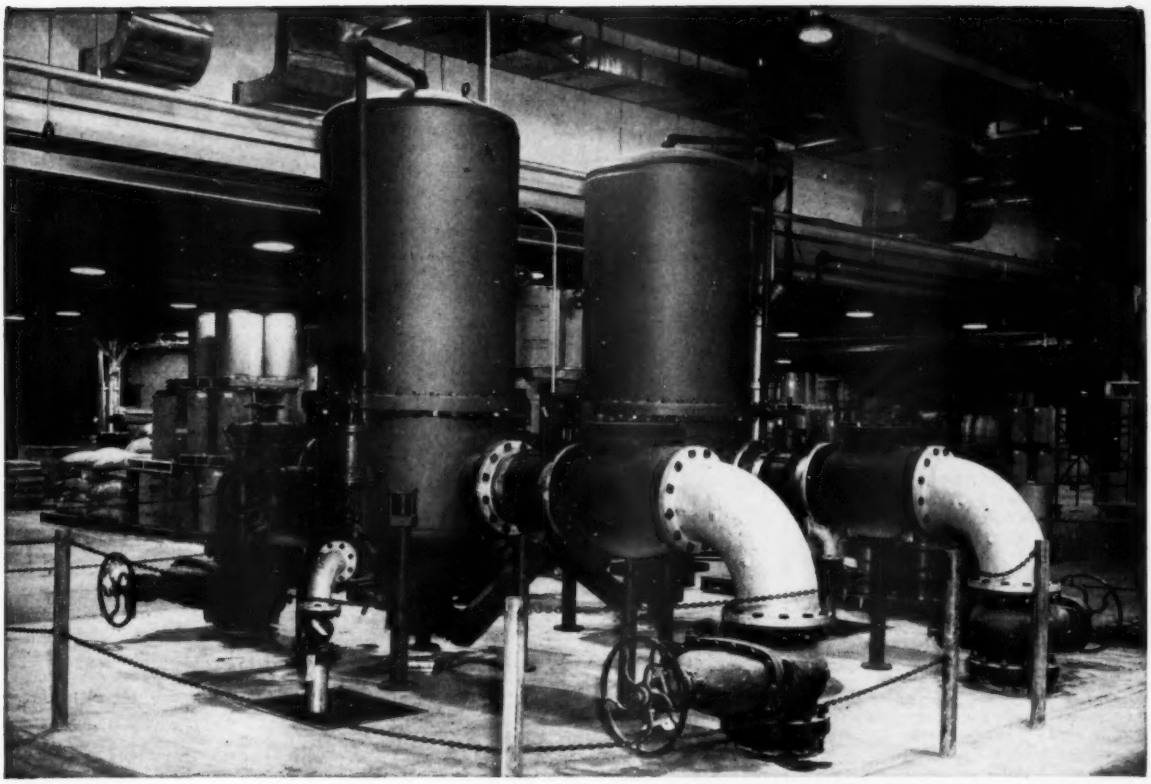

EVERY GRAIN OF SAND IS REMOVED from the well water passing through these abrasion-resistant FLO-KLEAN filters at the new Upjohn Company plant in Kalamazoo, Michigan.

Upjohn saves 2000 dollars a month

FLO-KLEAN filters protect valuable equipment at pharmaceutical plant

Maintenance records at the Upjohn Company's ultra-modern plant near Kalamazoo, Michigan, show that FLO-KLEAN filters are responsible for saving up to $2000 a month in maintenance costs.

These Cuno FLO-KLEAN filters, used to remove sand and gravel from incoming well water, ordinarily take something like a teaspoon of sand out of each thousand gallons. That doesn't appear to be an impressive quantity, but it could cause serious damage to stainless steel valves, pumps, water softeners, condensers and other valuable equipment. Purity of process water is assured by the high-capacity FLO-KLEAN units.

Recently the wall of one of their thirteen 250 feet deep wells gave way, dumping large quantities of sand and gravel into the water system. Every bit of this sudden deposit (almost seven cubic yards) was removed by the FLO-KLEAN filters. Without interrupting service, FLO-KLEAN continued its automatic operation and saved Upjohn a serious operating and maintenance loss.

In hundreds of applications throughout industry the fully automatic, continuously self-cleaning FLO-KLEAN filters have paid for themselves many times over by making river, lake, or well water fit for industrial use . . . and without loss of backwash water. Other uses include reclaiming industrial process water and coolants. If you need or use between 200 and 100,000 gallons per minute of clean water, find out how FLO-KLEAN can save you money. Write for free FLO-KLEAN bulletin to the Cuno Engineering Corporation, Dept. 271F, Meriden, Conn. 3.1

CUNO

ENGINEERED FILTRATION

Removes More Sizes of Solids From More Kinds of Fluids

AUTO-KLEAN (disc-type) **MICRO-KLEAN** (fibre cartridge) **FLO-KLEAN** (wire-wound)

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Identified by the BLUE FIBERGLAS BACK

How a 'Sexauer' Easy-Tite faucet washer costing pennies can save you $115.22 a year!

A tiny, 1/32" faucet leak wastes 95,040 gallons—*$24.14* worth*—of water yearly.

Hot water leakage is even costlier . . . Fuel waste adds upward to *$91.08*** more to the loss. Total down the drain: *$115.22.*

And this is the dollar loss caused by only *one* pinpoint leak!

Fuel Waste	Water Waste	Total Waste
Oil (792 gals.) **$91.08	$24.14	$115.22
Coal (9,879 lbs.) 88.91	24.14	113.05
Gas (84,411 cu. ft.) 84.81	24.14	108.95

*Water costs (figured at $1.90 for 1,000 cu. ft.) authenticated by Hackensack Water Co. **Fuel costs authenticated by American Gas Association.

Save money; cut costs; stop leaks with dependable 'Sexauer' Easy-Tite faucet washers.

Built like a tire with Fiberglas reinforcement

Easy-Tite faucet washers are made of a special du Pont product, instead of rubber, and reinforced with Fiberglas. The result is a washer that resists the closing squeeze that splits and mushes ordinary washers. And Easy-Tites withstand destructive heat (up to 300° F. by test). These features explain why *'Sexauer' Easy-Tites outwear ordinary faucet washers 6 to 1!*

By avoiding labor on those 5 additional repairs, Easy-Tites cut today's high maintenance costs 83⅓%! But Easy-Tites not only save water, fuel, labor; they also prolong the life of expensive fixtures.

FREE CATALOG Easy-Tite faucet washers are just part of the line of over 3000 'Sexauer' Triple-Wear plumbing repairs parts and patented precision tools.

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SEXAUER

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DATA FILE

(Begins on page 210)

neering data and performance characteristics to enable plant engineers to approximate power requirements, rotative speed and discharge temperature for most multi-stage centrifugal compressor applications. Clark Bros. Co., Inc.

257 Compressors — Bulletin A72, 36 pp, gives construction, operation information on company's Class WN-114 heavy-duty air compressors. Illustrates seven models of compressor as a single unit for displacement capacities from 1186 to 1948 cfm, twin units furnishing up to 3896 cfm. Joy Mfg. Co.

258 Reciprocating Compressor—In addition to information on new Freon 22 units and duplex models, 32-pp Bulletin DS-361 has capacity tables, specifications and information on operating features for compressors and condensing units with capacities from 10 to 100 tons. Describes automatic multi-step capacity control, designed to meet wide fluctuations in air conditioning loads. The Trane Co.

259 Compressors, Pumps — Catalog 546, 6 pp, presents company's line of air and gas compressors, Oilfrcair and Oilfregas compressors, dry vacuum pumps, aftercoolers, Aircheck valves, and centrifugal pumps for boiler feeding and general applications. Pennsylvania Pump and Compressor Co.

260 How to Solve Pumping Problems—A new printing of this popular 36-pp booklet makes it again available to plant engineers. Filled with helpful technical information, explains design and operation of rotary gear pumps and discusses factors of pumping problems, covering some sample ones in detail. Illustrated, provides friction loss and conversion tables, electrical data, viscosities of liquids, construction materials for handling various liquids, resistance of valves and fittings to flow of fluids. Geo. D. Roper Corp.

261 For Abusive Pumping Jobs — Catalog 4906, 36-pp, covers centrifugal pumps for wide, industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage side suction pump; a horizontal shaft, single-stage, rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings for wet pit applications. Nagle Pumps.

262 Data on Pumps—This 12-pp condensed catalog covers turbine-type and centrifugal pumps for a wide range of industrial uses. Gives construction specifications, capacities, application information as well as reference to specific literature on each type. Fully illustrated. Also includes data on mixed flow pumps, sump pumps. Aurora Pump Co.

264 Installing a Pump — Blaming many pump operating troubles on improper pump selection and installation, this 8-pp technical article tells what should be taken into consideration when ordering a pump. Titled "Studying the Installation," it discusses head, viscosity, pipe friction, suction lifts, horsepower and materials. Illustrated. Viking Pump Co.

PACKINGS, GASKETS, SEALS

265 Packings and Gaskets—In this 40-pp belting and packing manual (NY-2697-P) are helpful charts plus information on the care, use and maintenance of rod and sheet packings and gaskets. A complete engineering section contains all necessary charts and tables for determining working specifications of packings. Also included are packing recommendation charts. New York Belting and Packing Co.

266 Braided Packing—Illustrated 8-pp Bulletin A-131 describes manufacturer's Lattice Braid rod and shaft packings. Points out construction features, and discusses available materials, sizes and forms. Also contains service reports from users, and includes service recommendations. The Garlock Packing Co.

267 Shaft Seals—Form 455, 12 pp, presents a mechanical seal that rotates with the shaft and is designed to meet sealing requirements of centrifugal and rotary pumps, agitators, blowers, other rotating equipment. Explains advantages of these seals, gives recommended uses for six types, also for a double seal and a cartridge, sleeve seal. Durametallic Corp.

VALVES, TRAPS, PIPING AND ACCESSORIES

268 Bronze Valves—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions. Walworth Co.

269 Valves and Fittings—Illustrated Catalog 47 provides over 60-pp of ordering information and application data on valves and fittings made of stainless steel and other corrosion resistant alloys designed for use where corrosion or contamination are factors. Gate, globe, and angle valves for a wide range of services are presented, also needle valves, sampling valves, screwed and flanged fittings. Design and construction details are shown. Also included is a chart of first and second recommendations of alloys for corrosive media. Alloy Steel Products Co., Inc.

270 Relief Valves — Twenty-pp Publication 5200 is replete with data on company's multiport relief valves for steam, air and gas service. Charts, diagrams, tables and examples of plant operating conditions serve to show how to select a relief valve. Text and illustrations show advantage of these valves over other relief valves, and booklet also shows how the Multiport relief valve can be used as a differential pressure spillover valve or as a check valve in closed systems. Cochrane Corp.

271 Choosing the Right Valve—Presenting valve selection as a matter of matching the valve's service characteristics with the service requirements of the job, this practical 20-pp booklet explains and illustrates basic design features of gate, globe and check valves. It tells, in non-technical language, how each of these valve types works, and where it is best suited for use. Disc, stem connection, bonnet and

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Saved → $16,000.00 in one year

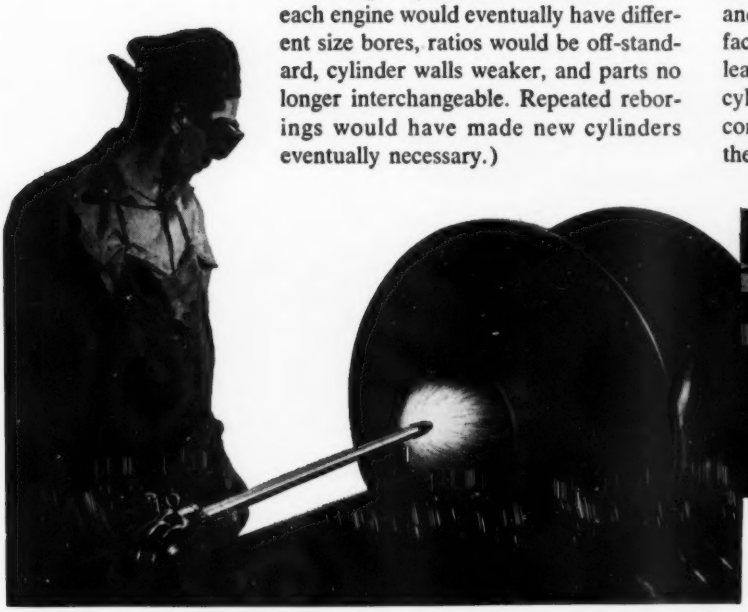
How one plant saved $16,000.00 in one year on one type of machine repair, with metallizing.

This large mid-West chemical plant uses fourteen gas engines, in compressor service, operating 24 hours a day. Fuel is a mixture of hydrogen, methane and air, with charcoal dust added to increase combustion efficiency.

Three methods of reconditioning these engines were available;

1. the cylinders could be replaced and standard sizes of other components preserved, at a cost of $450.00 per cylinder;
2. the cylinders could be rebored and fitted with oversized pistons and rings, at $400.00 per cylinder. (With this method, each engine would eventually have different size bores, ratios would be off-standard, cylinder walls weaker, and parts no longer interchangeable. Repeated reborings would have made new cylinders eventually necessary.)
3. Metallizing, at $125 to $150 a cylinder.

Cylinders are bored, threaded, grit-blasted, degreased and sprayed with Metcoloy #2 Stainless Steel, 20 to 30 pounds being applied. Cylinders are then finish-machined and honed to size. In the first year 64 cylinders were re-surfaced at a total saving of about $16,000.00, over the unsatisfactory method of reboring and fitting with oversized rings and pistons—$19,200.00 over the cost of new cylinders. Past experience with the greater particle hardness of sprayed metal, its better lubrication characteristics and the superiority of the stainless steel surface over the original cast steel cylinders leads this user to estimate that the rebuilt cylinders are good for another 15 years of continuous operation, about 50% more than the original life before reconditioning.



ABOVE: Gas engine — cylinders reconditioned with metallizing.

LEFT: Gas engine cylinder — being metallized while rotating in improvised jig set-up.

See other examples of metallizing illustrated in our 8-page Bulletin in your Sweet's Plant Engineering File — Section 7a/Me.

Just One Example. This is just one among many money-saving applications of metallizing in this plant. Almost any rotating or sliding machine part subject to wear, can be reconditioned with this modern repair process. Parts are kept to standard sizes, replacement stocks can be cut, and production "downtime" caused by delivery delays or shortages of new parts is eliminated.

Further Information. Send off the coupon for a call by a factory trained Metco Field Engineer, or a copy of Bulletin 51B, "Metallizing—Its Practical Applications."

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✓ "Vise Tight" Grip

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For more facts circle 652 on Reply Card

DATA FILE

(Begins on page 210)

bonnet-joint characteristics are also discussed and the importance of stem operation is treated. A final chapter is devoted to common materials of valve construction. Crane Co.

272 **Valve Maintenance Guide** — "Prevent Valve Failure Before It Starts," is a 28-pp text on valve selection, installation, inspection. Pictures damaged valves, explains how damage could have been prevented, discusses maintenance schedules, inspection jobs, lubrication, pipe line checking, threading, regrinding, disc replacement. Jenkins Bros.

273 **For Quick Valve Selection**—Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated and thumb-indexed, includes pressure-temperature chart. The Ohio Injector Co.

274 **Pressure Reducing Valve** — Bulletin 228, 8 pp, describes and pictures a pilot-operated pressure reducing valve for automatic control of reduced pressure required in steam service. Gives advantages of the valve, illustrates method of installation and explains its operation. McAlear Mfg. Co.

275 **Steam Trap Solutions**—Bulletin F.151, 36 pp, is the newest edition of this company's well known booklet, "Solving Steam Trap Problems." Organized for easy reference, this illustrated booklet provides specifications and capacities of steam and float traps, air release valves, pipe line strainers. Tells how to calculate condensation loads and select traps for unit heaters, jacketed kettles, submerged surfaces. Gives pointers on installing and servicing traps. Also included in this edition is information on combination float and thermostatic traps. The V. D. Anderson Co.

276 **Steam Trap Book**—Catalog J, 44 pp, includes physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps; a handbook section explaining how to calculate condensate loads and select traps for all classes of equipment; a maintenance section. Armstrong Machine Works.

277 **Steam Trap Reference Manual** — Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure trap sizes and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.

278 **Lightweight Pipes**—As a practical help to pipe users, Bulletin 507 shows typical applications of company's light-weight lockseam-spiralweld pipe and fittings. Includes standard specifications on pipe from 4- to 3-in. diam., also data on fabricated fittings, flanges, connections. Naylor Pipe Co.

279 **Piping for Permanence**—In presenting corrosion fundamentals of plumbing and heating systems, this 32-pp illustrated booklet contains data based on analysis of thousands of wrought-iron piping systems. Chapters are devoted to requisites of a piping material, building-piping systems, and water and its problems. Includes many service records. A. M. Byers Co.

280 **Jacketed Piping, Cocks**—Twelve-pp Bulletin 152 discusses the special advantages, problems and requirements of jacketed piping installations and shows how manufacturer's jacketed piping, cocks, fittings and relief valves are designed to fulfill requirements. Illustrated with photos and drawings, includes specifications. Parks-Cramer Co.

281 **Steel Unions**—This catalog sheet describes and pictures several types of steel unions, telling applications of each and listing sizes, prices. Clayton Mark & Co.

282 **Packless Expansion Joints**—Bulletin 35-51A offers 28 pp of up-to-date information on

NOW YOU CAN GET THE VP BOILER
UP TO 40,000 POUNDS PER HOUR CAPACITY

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Pressures—up to 500 pounds per square inch
Fuel—oil or gas
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Now the many advantages of the C-E Package Boiler, Type VP, are available to you in an even higher range of capacities. For Combustion has added two new sizes—for capacities of 35,000 and 40,000 pounds of steam per hour.

No C-E Boiler has ever "caught on" more quickly or received more widespread and enthusiastic acceptance than the VP. This can only reflect the *plus* values of its Extra Features such as:

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- **Large lower drum, which facilitates handling wide load swings . . . permits a simple, symmetrical tube arrangement . . . simplifies inspection.**
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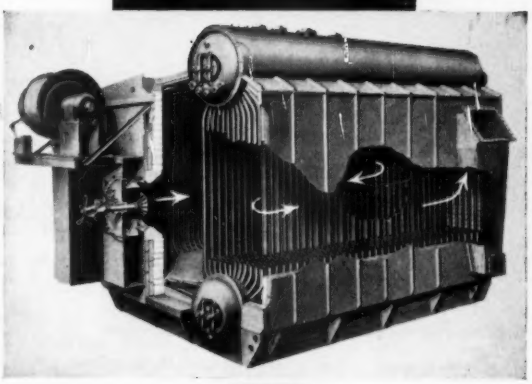
- **Simple baffle arrangement, which means maximum heat transfer rate . . . no dead gas pockets . . . simplified soot blowing.**



Consider, too, that many companies are discovering that they can get increased flexibliity—at lower cost—by meeting their entire steam requirements with two or more VP boilers rather than with a single, larger unit.

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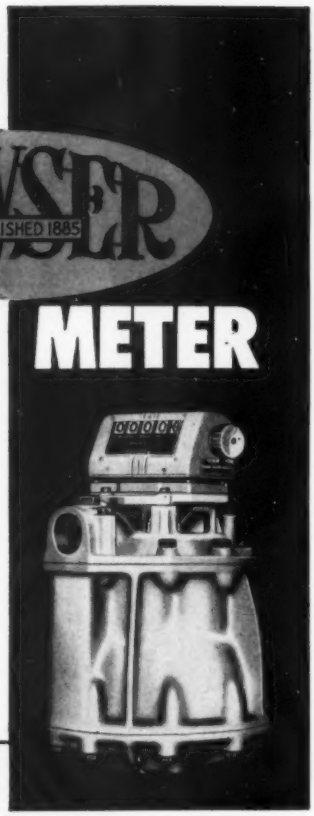

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Booklet describes complete line and uses of OTC tools.

OWATONNA TOOL COMPANY
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DATA FILE

(Begins on page 210)

company's Corruflex joints, their design and installation and advantages over other means of providing for thermal expansion in pipelines. Construction features are explained and illustrated; simplified selection data include tables for determining amount of expansion in pipelines. American District Steam Co., Inc.

283 **Welded Fittings**—Catalog 3 is a 36-pp ordering and engineering reference book on company's Weldolets for piping services. Gives data on butt-welding and socket welding Weldolets as well as on Thredolets for making threaded outlets. Typical installations are pictured; sizes, weights and prices provided. Also included are installation instructions and a technical section. Bonney Forge & Tool Works.

284 **Handbook on Fittings, Flanges**—Catalog wf-1950, 68 pp, offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure, ratings, physical and chemical requirements. Grinnell Co., Inc.

285 **For Stopping Pipe Leaks** — Illustrated Catalog 54, 32 pp, describes, gives specifications of manufacturer's line of steel, cast iron pipe repair clamps, service saddles, valve and bibb reseaters. Tells how to repair all types of leaks in water, steam, gas, oil lines, also gives installation tips. M. B. Skinner Co.

INSULATION

286 **Pipe Insulation**—Bulletin F 1-100 features on-the-job installation photographs of cellular glass insulation for pipe temperatures between —300 and 800 F. Complete listing of physical properties, condensed specifications are given. Pittsburgh Corning Corp.

287 **Flexible Duct Insulation**—Form F-180 describes and gives product specifications for fiber glass flexible duct insulation. Advantages are cited, and easy installation procedure is illustrated. Also included are data on thermal insulating and acoustical insulating qualities. Fiber Glass Div., Pittsburgh Plate Glass Co.

288 **Insulating Material** — Ultrafine, a new thermal and acoustical insulation made of blown glass fibers, is the subject of this bulletin. Complete with photos of insulation in use and tables showing its efficiency, gives physical properties, principal uses, handling characteristics, thermal conductivity, and acoustical efficiency. Gustin-Bacon Mfg. Co.

ELECTRICAL EQUIPMENT

289 **Motor-Generator Reference Book**—Publication 51R7933 is a 50-pp booklet compiled to assist in the selection of motive power to handle most industrial applications. Neither text book nor ordering catalog, this book provides a brief outline of the various types of motors, generators and motor-generator sets, telling their application and operating requirements. Booklet is generously illustrated and includes performance data, ratings, information on methods of speed control. Allis Chalmers Mfg. Co.

290 **Variable Speed Motors**—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls, etc. U. S. Electrical Motors, Inc.

291 **Brakes and Brake Motors**—Construction advantages of company's brakes are featured in illustrated Bulletin SL-610-1 on brakes and brake motors. Dimensions, mechanical and electrical characteristics. Crocker-Wheeler Div., Elliot Co.

292 **Motor Lubrication Tips**—"To Grease or Not to Grease" is an illustrated bulletin on lubrication of ball bearing motors. Gives general information on lubricants and lubricating agents. Discusses importance of lubrication to bearing life. Also covers choice of lubricant and procedure. Wagner Electric Corp.

DATA FILE

(Begins on page 210)

293 Motor Control—Company's line of relays, contactors, and starters is presented in 28-pp Catalog CS-28. Text and illustrations show greater accessibility, simplified wiring, unit construction and other design features which contribute to the easier installation, improved performance and longer service afforded. Booklet also discusses overload protection provided, and includes specifications and wiring diagrams. Cutler-Hammer, Inc.

294 Motor Controls—In this 28-pp bulletin the most important items in company's line of standard motor control apparatus for all industries are presented. Controls, starters and accessories are described and applications listed. Allen Bradley Co.

295 FHP Manual Starters—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual starters. Lists applications for them and pictures enclosures. Square D Co.

296 Motor Starters—Booklet 1062, 16 pp, describes motor starters having short circuit protection for 2200- to 5000-v systems. Illustrates starters using company's 50,000 kva interrupting capacity type ZHS contactor; also starters which will safely interrupt the circuit from a bus of unlimited capacity. Indoor and outdoor installations are pictured. The Electric Controller & Mfg. Co.

297 Cartridge Fuses—Form S-60, 12 pp, describes and illustrates manufacturer's dual-element cartridge fuses designed for long and controlled blowing time. Lists benefits afforded by these fuses and gives data on both ferrule type and knife-blade type. Provides selector table covering sizes of fuses for protection of single-, two-, and three-phase motors of 1/6 to 200 hp. Also includes time current curves. Economy Fuse & Mfg. Co.

298 Air-Cooled Transformers — Eight-pp Bulletin 153-A describes air-cooled dry-type transformers, stressing their advantages and listing typical applications. Illustrates, and gives construction details and specifications for standard types. Also pictures some special transformers and reactors. Sorgel Electric Co.

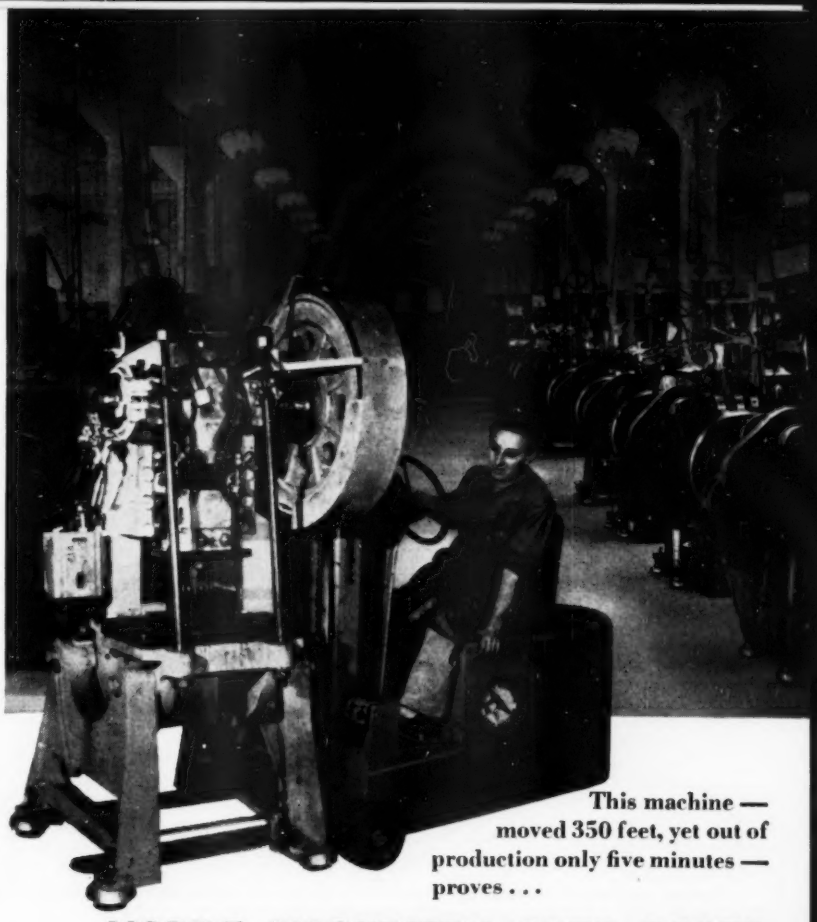
299 Productive Maintenance — Publication GED-1691 is a pocket-size 104-pp source of information of value to plant engineers who want to get more production from their present motors, generators and control equipment. Besides general maintenance suggestions, the booklet contains trouble shooting charts and recommended renewal parts guides. Also provides wire and cable data and includes a section of formulas and other data pertaining to motors and generators. General Electric Co.

300 Toggle Switch—Catalog 73a, 12 pp, covers 19 precision snap-action toggle assemblies and more than 90 AN and JAN approved designs, including assemblies that will control from 1 to 24 separate electrical circuits. Contains dimensions, operating characteristics, electrical ratings, contact arrangements on each switch, and an illustration of one representative switch from each group of switches. Gives general information on each "family" of switches, which are designed for low voltage d-c applications. Micro Switch Div., Minneapolis-Honeywell Regulator Co.

301 What You Should Know About Circuit Breakers — Sixteen-pp Manual 101 explains operating principles of basic circuit breaker designs and provides engineering data on factors of application. Includes simplified diagrams of three basic types. Illustrates with colored charts and diagrams, explains temperature factors, inrush current effects, tripping and reset time. Heinemann Electric Co.

302 Small Bus Duct—Detailed information on a midget-size bus duct is contained in Bulletin 703. Illustrates entire unit, also trap and hanger. Text discusses major parts, design features. Includes list prices. Frank Adam Electric Co.

303 Commutator, Slip Ring Maintenance—This practical little 40-pp handbook gives procedures and methods for commutator and



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DATA FILE

(Begins on page 210)

slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their correction; brushes; general maintenance; and company's products for maintenance of commutators and slip rings. Defines commutator terminology. Ideal Industries, Inc.

304 **The Answers on Wiring**—"20 Questions and 20 Answers on Safety m.i. Wiring" describes and illustrates characteristics and advantages of this new wiring system. A complete table of types, sizes, weights, and lengths, as well as a partial list of users included. General Cable Corp.

305 **Power and Control Cables** — Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Rome Cable Corp.

306 **Handbook on Storage Batteries**—This 64-pp booklet of instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

LIGHTING, COMMUNICATION

307 **Selection Data on Lighting Fixture Hangers**—Catalog 50, 80 pp, contains general and detailed information on disconnecting and lowering lighting fixture hangers, accessories, special devices and parts. Utilizes 247 photos and drawings to show construction principles, operating features, installations, modifications and component parts for both indoor and outdoor units. The Thompson Electric Co.

308 **Precision Lamps** — Bulletin 40 offers application and purchasing information on various types of lamps carried by manufacturer. Flood, infra-red, spatterproof, and weatherproof lamps are briefly discussed. Radiant Lamp Corp.

309 **Lighting Fixtures**—New Section K of Condulet Catalog 3000 describes components, performance data, and methods of relamping for any of the manufacturer's new EV series explosion-proof and weather resistant lighting fixtures. It contains illustrations showing steps for easiest relamping and installation of this type of fixture. Crouse-Hinds Co.

310 **Lighting Fixtures**—Full information on company's fluorescent lighting fixtures designed for efficient industrial lighting and reduced maintenance is provided in Form OD-568. Day-Brite Lighting, Inc.

311 **How to Use Sound Signals**—This new 44-pp combination manual, data book and catalog is an excellent reference work on industrial sound signals. Includes a simplified explanation of fundamentals of sound; a glossary of sound and signal terminology; a quick-comparison guide for selecting equipment; suggested steps in choosing a signal installation, and hints for compiling a code signal call system. Benjamin Electric Mfg. Co.

BOILERS, GENERATORS

312 **Packaged Boilers** — This 16-pp illustrated catalog describes manufacturer's new Type TP package boiler. Following a section of background information is an outline of principal design features of these boilers, which are shop assembled and provide steam capacities from 4000 to 30,000 lb per hour. Space requirements are shown in a table along with specifications. Combustion Engineering, Inc.

313 **Shop-Assembled Boiler** — Sixteen-pp, Bulletin G-76, completely describes and illustrates company's Type FM water-tube integral-furnace boiler, made in standard sizes

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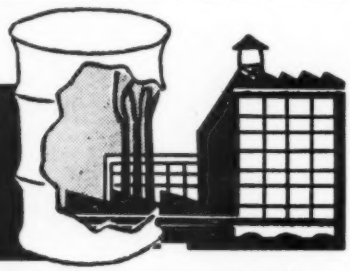

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DATA FILE

(Begins on page 210)

from 2900 to 28,000 lb of steam per hr, pressure to 250 psi. Capacities, dimensions given. The Babcock & Wilcox Co.

314 **Improved Steam Generator**—Bulletin 2000, 28 pp, explains advance design features that distinguish this manufacturer's generator from other unit steam generators. Describes and illustrates engineering differences of component features. Also shows how these components are constructed, assembled and tested. Another section gives data and dimensions and standard and accessory equipment for the units from 20 to 6000 hp for pressures to 250 psi. Preferred Utilities Mfg. Corp.

WATER TREATING

315 **Condensate Line Corrosion**—Attributing condensate line corrosion chiefly to carbon dioxide in the steam and water, Technical Paper 127 discusses various methods of minimizing boiler feedwater alkalinity, especially the use of filming amines. Reports field results under various conditions. W. H. & L. D. Betz.

316 **Industrial Water Service**—How this company is prepared to solve problems related to procurement, treatment, use and disposal of industrial water is told in this 10-pp booklet. Tells services and facilities available; discusses measures taken to solve some representative water problems. Hall Laboratories, Inc.

FANS, BLOWERS

317 **Fan Engineering Data**—Bulletin A-108, 16 pp, gives fan laws and formulas, terminology and recommended velocities for exhaust hoods. Includes air pressure conversion table, charts on dust resistance, entrance losses and rectangular equivalent of round ducts. Discusses fan installation, maintenance and lubrication, also noise problems. Hartzell Propeller Fan Co.

318 **Industrial Fans**—Propellair Bulletin 650, 12 pp, contains dimensions, application, and performance data of Tubeaxial and Stackbooster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

319 **Induced Draft Fans**—Eight-pp Bulletin DB-32-53 provides engineering information on manufacturer's Bifurcator fans for providing controlled draft for boilers and furnaces. Gives construction details, sizes. Illustrated with photos, diagrams of suggested methods for installation. DeBothezat Fans Div., American Machine and Metals, Inc.

HEATING, HEATERS

321 **Forced Air Space Heaters**—Illustrated Bulletin 523-B, 12 pp, is devoted to a line of forced air heaters for comfort heating, year-round ventilating, tempering make-up air, process drying and heat curing. Explains design efficiency, construction details, operating principles and flexibility of application. Advantages of the heater are detailed. Dravo Corp.

322 **Buying a Portable Heater?**—Stressing safety factors involved, this 40-pp booklet, "Guide to the Selection and Use of Portable Space Heaters," analyzes temporary heating equipment from standpoints of personnel well-being, property protection and fire and accident prevention. Classifies basic types of direct, indirect-fired heating devices. Herman Nelson Div., American Air Filter Co., Inc.

323 **Engineering Data for Heating Systems**—A great deal of helpful information on heating systems is presented in Engineering Data Manual 2695, 28 pp. Detailed illustrated information pertaining to heating problems is given. Besides covering heating terminology, there are sections on steam data, water properties, piping data, weights and measures and pipe dimensions. C. A. Dunham Co.

324 **Plumbing, Heating Supplies**—Edition G is the current edition of this company's 118-pp general catalog on plumbing and heating re-

Only ADSCO's exclusive features make maintenance so easy. There's no breaking of pipe connections to inspect or service the trap, because all working parts are mounted on the cover. An extra cover assembly becomes a complete spare trap . . . replace the cover in a matter of minutes, service the original, and the result is a spare trap always ready.

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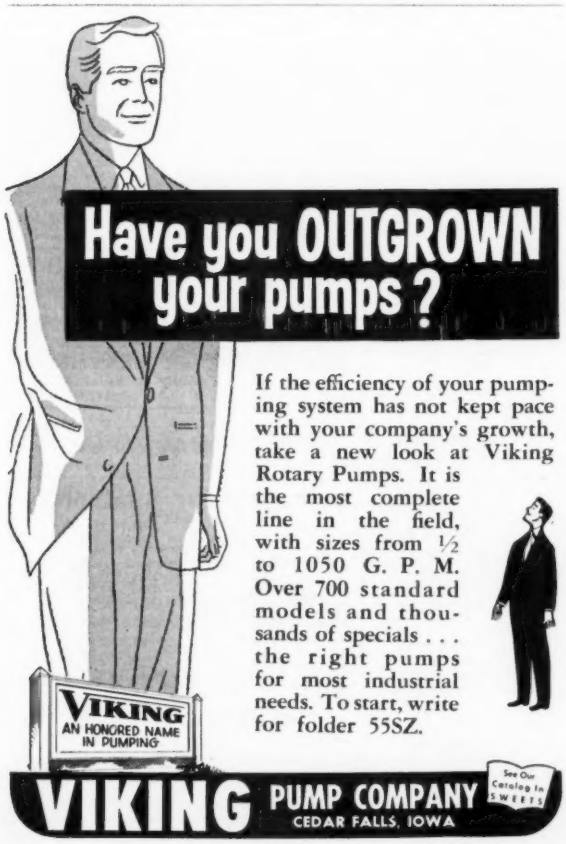

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Approximately 2,000 gallons of aluminum paint were used on the interior of these Fort Worth, Texas, warehouses. At time of painting, warehouses were owned by Leonard Brothers Department Store. They are now owned by Service Life Insurance Co.
Aluminum Paint: 917 Brilliant Finish, Jones-Blair Paint Company, Dallas, Texas.

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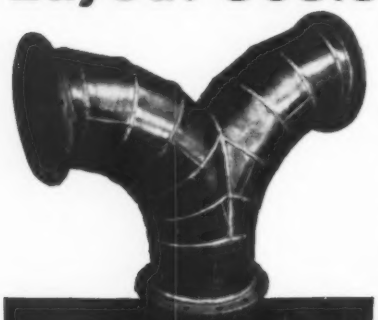

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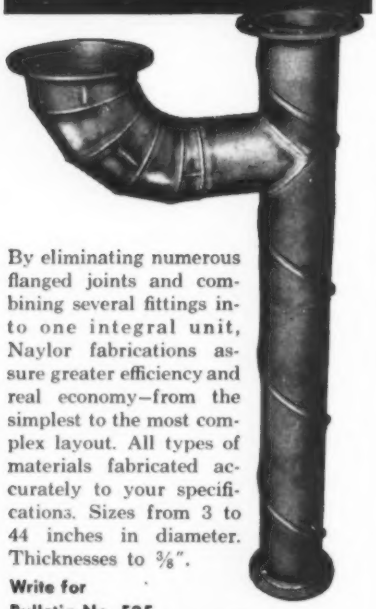

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DATA FILE

(Begins on page 210)

pair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses and ordering data. J. A. Sexauer Mfg. Co., Inc.

325 **What Unit Heaters Can Do**—Featuring many photos showing how unit heaters are being used to provide heating comfort, cut fuel costs, provide economical air circulation, 8-pp Bulletin 149-A discusses advantages of these heaters and gives performance data. Modine Mfg. Co.

326 **Hot Water Storage Heaters**—Catalog 18, 48 pp, illustrated in color, describes company's line of hot-water storage heaters, presents information on piping arrangements, installation data. Catalogs horizontal and vertical heaters as to weights, dimensions, construction, capacities—with conversion tables. Includes piping diagrams for high and low pressure steam systems, step-by-step guide for setting up and connecting a storage heater. Gives average water requirements of typical hot water fixtures. The Patterson-Kelly Co., Inc.

327 **Steam Heating Systems**—Five major types of steam heating systems, with and without control, and a full line of valves, traps and steam power specialties are described in Bulletin 110, a 20-pp condensed catalog. Features company's Selectotherm system—automatically controlled high vacuum steam heating system that adjusts its heat output and fuel consumption to outdoor temperature conditions. Also describes a system for installations that are zoned, that use steam for purposes other than heating, and that use steam supplied by central station. Illinois Engineering Co., Div., American Air Filter Co., Inc.

OVENS, DRYERS

328 **Industrial Ovens** — Engineering, manufacturing and installation of processing ovens are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry, source of heat, selection of heaters, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

329 **Industrial Ovens** — Thirteen types of company's Convectioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers, plastics producers. The W. W. Sly Mfg. Co.

330 **ABC's of Dryness**—Eight-pp Bulletin 16.0.081 presents packaged dehydration units for efficient drying of air or other gases. Tells what these dryers can do, what they will remove dryness from and where they are recommended for use. Explains drying operation; discusses absorbents and equipment utilized, giving construction details and sizes offered. Typical arrangements for both full-stream and split-stream reactivation are diagrammed, and selection information included. Equipment Div., J. F. Pritchard & Co.

CONSTRUCTION

332 **How to Use Presdwood**—This 32-pp booklet is filled with design and construction data on Presdwood. Although much of the material presented deals with use of Presdwood in homes, the book offers suggestions of value in industrial construction and remodeling. Sections of this practical handbook cover product data, working, application information for both interior and exterior use, and specifications. Includes instructions on proper conditioning, use of adhesives, types of bends finishing, interior joints, fastening. A table shows properties, sizes available and intended applications. Masonite Corp.

334 **Lowdown on Suspended Ceilings**—Twelve-pp Bulletin A-129 is a "tell-all" brochure on a radiant panel heating, cooling, and acoustic control ceiling. Tells how company's three-way functional (suspended) ceiling is easy to lay out and install, competitive in cost. Diagrams and charts accompany text, which includes a brief of 12 advantages of this ceiling. Also provides departmentalization of components, performance characteristics, design and layout procedures, installation short cuts. Burgess-Manning Co.

336 **Heat Absorbing Glass**—This 16-pp catalog describes Coolite, a glass designed to trap and absorb much of the sun's heat and to filter out annoying glare. Discusses types and thicknesses, gives light transmission data. Pictures many industrial installations and shows how conditioned natural illumination helps reduce operating costs. Mississippi Glass Co.

337 **Non-Slip Flooring**—Algrip, an abrasive rolled steel floor plate described as non-slip even on steel inclines, is the subject of Booklet A-5, 8 pp. Discusses safety features; gives fabricating data, sizes, allowable loads. Alan Wood Steel Co.

338 **Industrial Doors**—This 16-pp 1954 door catalog furnishes listings and illustrations of manufacturer's line of doors, and provides helpful information on their use. Describes designs for turn-over, bi-fold and telescoping canopy doors, vertical lift, slide, and special purpose doors. International Steel Co.

MAINTENANCE

339 **Tar Base Coatings**—Now available is a collection of five bulletins on company's 100 series of cold applied tar base coatings. One bulletin gives general information on the full line and provides an application chart. The others give detailed specifications and application information on the various types. These include a coating for protection against severest corrosive conditions; a thin high gloss coating for general maintaining purposes; a coating for protection against generally severe

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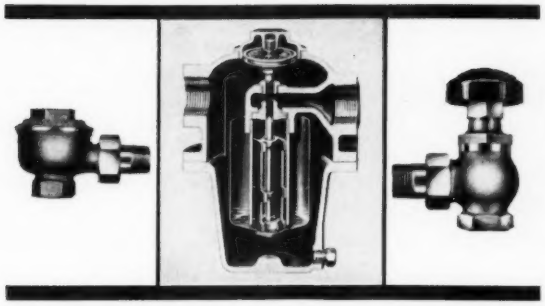

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DATA FILE

(Begins on page 210)

corrosive conditions; and one for water tank interiors. Pittsburgh Coke & Chemical Co.

340 **Basic Roofing Information**—"What You Should Know About Your Roof" is a 40-pp, clearly illustrated booklet which tells what makes a roof fall, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job, also special features of company's roofing materials. Johns-Manville.

341 **Guide to Rust Prevention**—The 24-pp 1954 edition of this company's general catalog provides a treatise on rust prevention. Features 94 color chips of manufacturer's products and includes instructions for surface preparation and application of primers, short- and long-oil types, machinery and implement finishes, chemical and heat resistant types, sealers, oil field finishes, thinning oils and floor and masonry coatings. Presents a restful color group of finishes for plant interiors; also describes special finishes. Rust-Oleum Corp.

342 **Painting with Aluminum**—Again made available to plant engineers is Form AD-228, 32 pp, on the use of aluminum paint. Discusses advantages of aluminum paints, describes three basic types for non-absorbent surfaces for weather-exposed wood, and for heated surfaces and those not exposed to weather. Typical maintenance applications are covered in text and picture and practical suggestions for good results included. Use of aluminum paint on steel, galvanized metal, wood, masonry is detailed. Aluminum Company of America.

343 **Protective Paints**—Details on a rubber-base paint formulated to afford increased protection against corrosion from acids and alkalis, and especially applicable for use on concrete, are provided in this literature. These finishes are also suggested for wood and metal surfaces. Cellulose Products Dept., Hercules Powder Co.

344 **Hot-Dip Galvanizing**—How hot-dip galvanizing is prolonging life of industrial equipment is stressed in this 16-pp booklet. Photos showing galvanized equipment in use accompany brief text explaining how this process of covering iron and steel with a protective coating of zinc serves to prevent rust. The galvanizing procedure is explained and illustrated. Coating comparison charts show how hot-dip galvanizing compares with other types of coatings as to rust resistance, dimension limits, shock resistance, initial and maintenance costs. American Hot-Dip Galvanizers Assn., Inc.

345 **Corrosion Protection Data**—A detailed study of the performance of various protective coating systems, this bulletin gives test data on 11 coating systems exposed up to 83 weeks in hydrochloric acid atmosphere. Illustrated with photos, includes corrosion-failure time comparison chart. Gates Engineering Co.

To order these catalogs circle item numbers on the handy Reader Service Cards provided on pages 205-206.

346 **Blower-Suction Cleaner**—Data on a portable combination blower suction cleaner for cleaning machinery motors, stock bins are offered. Describes models available, attachments for a wide range of cleaning jobs. Clements Mfg. Co.

347 **Building Maintenance**—Handbook 7 offers 64 pp of information on floor surfacing, leak stoppers, external wall sealants, road patching, roofing materials. Includes instruction for use. Flexrock Co.

348 **Proper Care of Floors**—Filled with what-to-use and how-to-use-it information, this 32-pp booklet is a well written, practical text on floors. Presents floor preservation as a triple process involving cleaning, sealing and maintaining. Discusses various floor surfaces and their special problems. Gives helpful hints on floor maintainance and provides a handy chart covering preparation procedures and products for 12 common floor surfaces including cement, wood. West Disinfecting Co.

349 **Floor Scarifier**—Bulletin 83.4 describes and pictures a new hydraulically equipped machine designed for removal of traffic-packed grimes from trucking aisles in industrial plants. Explains how it cuts, picks up grime in one operation. G. H. Tennant Co.

350 **For the Overhead Jobs**—Scaffolds designed to make overhead work safer and easier are described in 16-pp Form 10-852. Illustrates and discusses adjustability, large working platform, easy assembly, self-locking trusses and other advantages. Baker-Roos, Inc.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

351 **Tools for Mechanics**—Catalog U is a 106-pp ordering book covering a wide range of power and hand tools for production, maintenance and service work. Describes, pictures and gives application tips and sizes on wrenches of all types, pullers, drills, sanders, polishers, grinders, reamers, taps and dies, testing tools, soldering irons, tool sets, benches and cabinets. Includes price list. Snap-on Tools Corp.

352 **Machine Tools, Their Lubrication**—A history of machine tools, and explanation of their mechanical aspects and an analysis of the role of lubricants in their maintenance and operation are contained in this 80-pp booklet. Not a manual on tool lubrication, this book is a comprehensive discussion of fundamental factors in the construction, operation and maintenance of modern machine tools. Shows how power is controlled and force directed to

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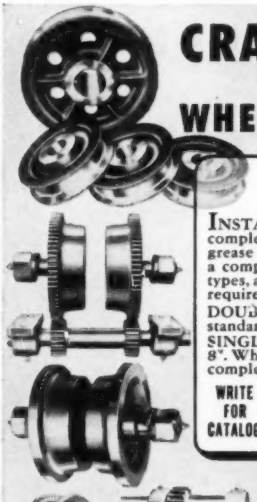

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INSTALL THESE WHEEL ASSEMBLIES complete with axles, bearings, drive gears, grease fittings and all necessary parts for a complete installation. There are sizes, types, and styles of mounting to suit every requirement.

DOUBLE FLANGED WHEELS range in standard tread diameters from 7½" to 24"; SINGLE FLANGED WHEELS from 4" to 8". Wheels are available unmounted or in completely assembled units.

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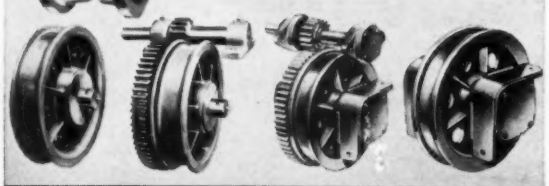

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Electric Cranes ● Hand Cranes ● Jib Cranes ● Sheaves ● Sheave Blocks Plate Grips ● Plate Hooks ● Crane Trolley Hoists ● Crane Wheels ● Crane End Truck Units ● Jib Crane Fittings ● Automatic Mechanical Load Brake Crane Hook Blocks

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LO-HED CAR PULLER

IT'S BEEN PROVED on installations everywhere! Install a Lo-Hed Car Puller at your siding, and cars will be loaded and unloaded in far less time. You'll also eliminate a frequent cause of industrial accidents. And for full measure, your demurrage costs will be cut and you'll get no more bills for shifting charges.

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AE Products are: Taylor and Perfect Spread Stokers, Marine Deck Auxiliaries, Hydramite and Hele-Shaw Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers.

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PET® POWER TOOLS

shift gears to AMPCO* Metal

Eliminates gear failures; gives portable saw long, dependable life under severe service conditions

Of the first 1,000 saws built, approximately 40% failed on test because material did not meet gear standards established by PET Engineering Department.

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Ampco Metal really pays off in severe service. It has high compressive strength — doesn't squash out. It resists abrasion, corrosion, cavitation-erosion. It gives high impact and fatigue values, and has excellent bearing qualities.

Get longer life, extra stamina. Ask your nearest Ampco field engineer or write us. *Reg. U. S. Pat. Off.

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Sole producer of genuine Ampco Metal

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Used by Leaders in Industry for

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They're Simple · Easy to Install · ACCURATE · Give many years of Reliable Service

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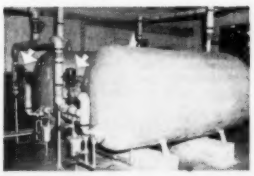

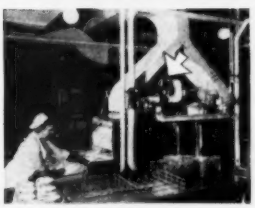

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DATA FILE

(Begins on page 210)

shape metal by cutting and chipping; analyzes factors that contribute to friction and wear; and describes role of lubricants. Shell Oil Co.

353 Hydraulic Pullers — Industrial maintenance problems involving removal and installation of gears, bearings, pulleys sheaves, pinions shafts, couplings and tubes are treated in Power-Twin Bulletin HY-1953, 24 pp. Covers use and application of pullers, attachments and adaptors for 17½-, 30- and 50-ton hydraulic rams. Also shows puller sets for use with company's center-hole rams. Owatonna Tool Co.

354 Ram Type Turret Lathes — Catalog 101-A, 28 pp, explains and illustrates how this company's ram-type universal turret lathe is designed to provide more power transmission, more time saving, more width where it counts, more ease of operation, more accurate stops and other advantages. Large colored illustration shows construction features of the lathe. Bar and chucking equipment are pictured. General specifications for five models are included. Jones & Lamson Machine Co.

355 Improved Cutting Oils—Cutting oils for keeping parts and tools up to 50 deg cooler and representing a new concept in non-emulsifying oils are described in two new technical bulletins. Form A-2724 describes Sunicut 11-S and 209-S, non-staining dual-purpose oils primarily for medium duty to heavy duty operation on automatic screw machines. Form A-2723 covers Sunicut 102-S and 110-S, which contain active-type sulfur and are effective for heavy-duty operations. Sun Oil Co.

356 Data for the Shop—"Fluids and Facts for Metal Working," is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Booklet also includes product data on industrial oils, machine tool lubricants, greases, quenching and tempering oils. Standard Oil Co. (Ind.).

357 Metal Spraying Gun—Company's Type 4E gun for high-speed spraying with all metals is described in Bulletin 94. A cutaway drawing shows construction features of the gun which is designed for tool-post mounting or hand operation. Metallizing Engineering Co., Inc.

358 Resistance Welding—Featured in this 24-pp catalog are newly-designed tips and holders recently added to company's equipment. Full information is also given about other holders, tips, seam welder wheels and shafts and bushings, in manufacturer's line, as well as flash, butt, barrel and other welding dies. Ampco Metal, Inc.

MAGNETIC EQUIPMENT

359 Magnetic Selection Guide — Twelve-pp illustrated Catalog of C-5000-B, describing manufacturer's entire line of magnetic separators and lighting magnets, serves as handy guide to the selection of magnets. Dings Magnetic Separator Co.

360 Magnetic Pipeline Traps — Bulletin B-203 describes magnetic pipeline traps for sanitary and standard applications. These permanent (non-electric) traps are designed to remove tramp iron from liquid flow lines and afford protection to processing equipment. Typical trap installation data given. Eriez Mfg. Co.

VENTILATING AND AIR CONDITIONING

361 Heating, Ventilating Units — Catalog 1620, 40 pp, helps the plant engineer plan, specify and order the proper heating and ventilating units (air volumes from 1200 to 23,000 cfm; heating capacities from 100,000 to 2,500,000 Btuh) for moving, heating or cooling of air. Five data sections cover descriptive performance, layout, engineering and service. For determining unit size, a step-by-step procedure is included. Hypothetical problems show proper use of performance data, curves and charts in selecting correct unit. Sturtevant Div., Westinghouse Electric Corp.

362 Industrial Ventilation Guide—Bulletin 1520, 28 pp, presents ventilating problems peculiar to industry and shows some of the ways in which company's equipment is solving those problems. They cover general ventilation, heat and steam exhaust, smoke and fume exhaust, air circulation, equipment cooling, dust removal, air filtering, heating. Includes data on air change requirements, information on fan selection, and location use of ducts with propeller fans. Ilg Electric Ventilating Co.

363 How Conditioning Units Can Help—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling and on hot water and steam heating. Clarage Fan Co.

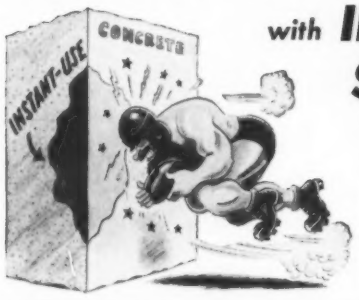
364 For Climate Control — Bulletin 122, 8 pp, introduces an air conditioner designed for precise and economical control of air temperature and moisture. Illustrates design of the new machine, tells its features, and pictures some installations. Tells how it may be used in heating and cooling processes, and how it permits processing of moisture-sensitive materials. Niagara Blower Co.

365 To Keep Out Moisture—Vents designed for easy installation on any roof to keep out wet, foul air are described in this literature. Muckle Mfg. Co.

SAFETY, SANITATION

366 Fire Extinguisher—How to Extinguish a fire in 11 sec by use of the Fyr-Fyter instant extinguisher with "loaded stream" chemical

REPAIR CONCRETE with INSTANT SETTING PATCH



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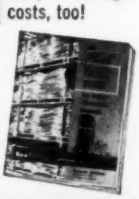
PALTIER records are filled with proof after proof of storage cost cuts in the handling of every conceivable type of product. We can cut your storage costs, too!

ASK US:

- PALTIER studies your storage problem—engineers and designs a system for your specific needs.
- Many PALTIER installations pay for themselves "right from the start."
- This booklet tells the PALTIER story, ask for it today.



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- **It never requires lubrication under any conditions.**
- **It operates as well indoors as out—under dry, dusty conditions, or where submerged or subjected to moisture.**
- **It resists abrasion—never sticks.**
- **It can be installed at low cost without special tools in a minute or two on all roller conveyors.**
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- **It is available for use with standard tubing with O.D. up to 4".**

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"NO MAINTENANCE"—NO REPLACEMENT OILLESS BEARING—

One of millions giving year-in, year-out service—many are specified on new roller conveyors; many are replacing high maintenance conventional bearings in old conveyors.

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20 years without a drink

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DATA FILE

(Begins on page 210)

liquid, "Karbaloy," is pictured in Bulletin F-1158. Lists advantages of 500 lb stainless steel model. The Fyr-Fyter Co.

367 **Advice on Washrooms**—Information on company's washroom advisory service is available to plant engineers. Tells of plans and specific suggestions for improving washrooms included in this service. Scott Paper Co.

368 **Hand Dryer**—Form 1123 describes and pictures a high-speed hand and face dryer for use in industrial washrooms. Tells special features. The Chicago Hardware Foundry Co.

DUST CONTROL

369 **Manual of Exhaust Hood Design**—Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of dust control installations show various methods of hooding dust sources. American Air Filter Co., Inc.

370 **Dust Control**—"Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoint of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size, distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

372 **Dust and Fume Eliminators**—Catalog 482, 12 pp, describes company's Centri-Merge dust and fume eliminators explaining advantages of the swirl action incorporated. Illustrations and dimensional drawings of units with capacities ranging from 400 cfm up to 5000 to 30,000 cfm. Schmieg Industries, Inc.

HOSE AND TUBING

374 **Hose and Tubing**—Catalog CC-400 is a 16-pp illustrated quick-reference booklet on manufacturer's flexible metal hose and tubing. These products are made in two basic types: seamless and strip wound. Catalog shows wide range of available alloys and sizes, suggested uses; gives engineering data. The American Brass Co.

375 **Tubing for Many Jobs**—Flexible tubing for ventilation, fume and dust removal as well as materials handling is described in 8-pp Catalog C2-4. Gives detailed information on company's Spiratube A and Spiratube R, two types of lightweight tubing made from continuous helical coils of spring wire wound with overlapping plies of fabric. Gives applications. Flexible Tubing Corp.

VIBRATION CONTROL

376 **Engineered Vibration Control**—Bulletin 104 presents spring, cork and rubber mountings, discusses advantages of each and use alone or in combinations. Provides helpful selection chart covering a wide range of machines, showing recommended and alternate methods of isolation. The Korfund Co.

377 **Improved Machine Mounts**—This brochure describes advantages of company's leveling machine mounts. Tells how they enable installation and leveling of heavy machines without bolting or shims, afford increased plant mobility, reduce maintenance costs, and lessen noise. Barry Corp.

378 **Simplified Isolation**—A simplified method of machine isolation which utilizes pads and cement is described in this folder. Tells how it cuts maintenance cost. The Felters Co.

OTHER EQUIPMENT

379 **Continuous-Cast Bronzes**—This 12-pp bulletin describes, illustrates Asarco continuous-cast bronze products including copper alloy rods, valve guides, air brakes, packaging machinery. Tables include typical physical properties of foundry alloy cast by three methods; impact tests revealing high safety factor for heavy-duty parts. Lists specifications, sizes, weights on rods, bars. American Smelting and Refining Co.

381 **Steel Reservoirs, Standpipes**—This 24-pp booklet pictures installation of reservoirs of 50,000- to 10,000,000-gal capacity, having cone, umbrella or ellipsoidal roofs and ornamental structures with special architectural features. Provides table of standard capacities, information on foundations, use of suction tanks for fire protection. Chicago Bridge & Iron Co.

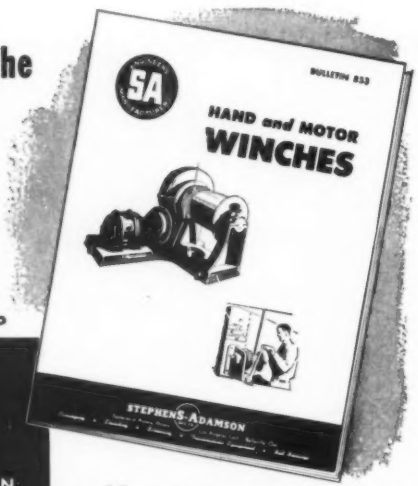
382 **Industrial Leathers**—These illustrated data sheets cover company's leather products and include specifications on various types of leather belting. Also gives data on leather packings for hydraulic and pneumatic equipment. J. E. Rhoads & Sons.

383 **Industrial Non-Metallics**—Polypenco Nylon, Teflon, filled nylons, and other non-metallics are the subject of this bulletin. Illustrated with photos, gives characteristics and advantages of these materials, data on rod, strip, tubing and slab available, parts that can be produced. Polymer Corp. of Pennsylvania.

384 **Bin Gates, Valves**—Twenty-pp Bulletin 1252 covers manufacturer's line of gates and valves, including the Twistite double closure bin valve and the Moore bin gate. The latter, for heavy duty applications, consists of an apron belt which can be rolled away from the bin opening. Complete details and dimensions are provided. Stephens-Adamson Mfg. Co.

385 **Handbook on Fluid Circuits**—Now available to plant engineers is the second printing of "The Circuit Rider." This 32-pp pocket-size manual presents a down-to-earth discussion, together with drawings, of basic designs in fluid power circuits and points out the wide range of operations possible through the application of different types of such circuits. The Logansport Machine Co., Inc.

Choose the Right Winch for the Job!



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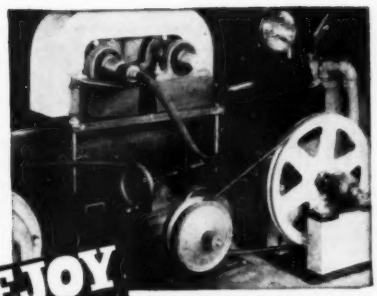

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Variable Speed Transmissions

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Make accurate speed adjustments on all types of machinery, new or old, for: *testing—operator ability—variously sized parts or stock—material differences—any other operational variables* . . . without loss of time or labor.

Easily installed, Lovejoy Select-O-Speed Transmissions provide better, more efficient production control to help you improve the quality of your products.

Speed ratios to 10 to 1. Sizes to 5 hp. Hand lever or wheel control. Operate with standard V-belt drives. Fully enclosed.

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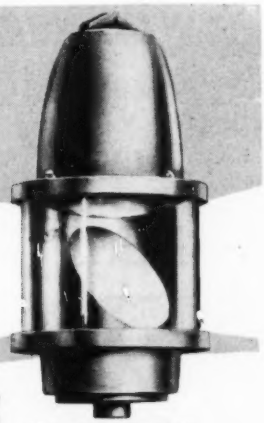

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The warning beam of light from this Beacon Ray will penetrate through any noise levels! Rotating through 360° this concentrated beam will reflect off any bright surface to warn the unwary even though they may be facing the other way.

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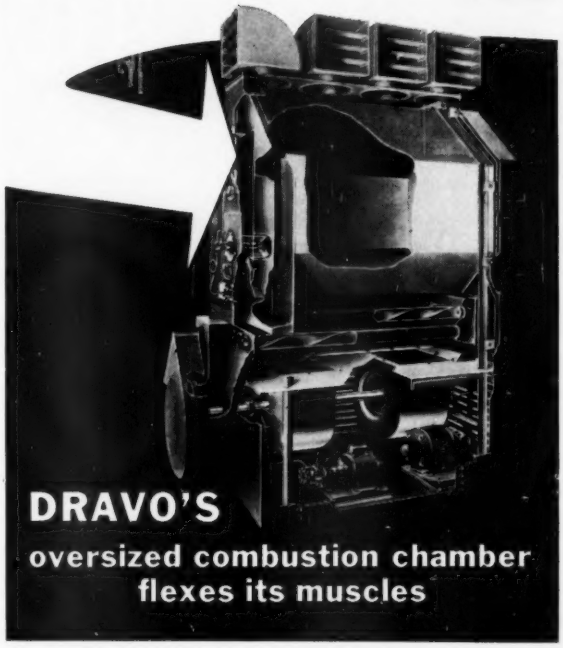

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OVERSIZE . . . Dravo's *larger* combustion chamber delivers rated output, with metal temperatures never exceeding ½ to ¾ of scaling temperatures. Result . . . longer service life for you.

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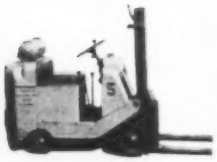

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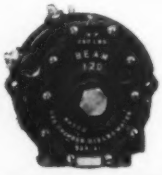

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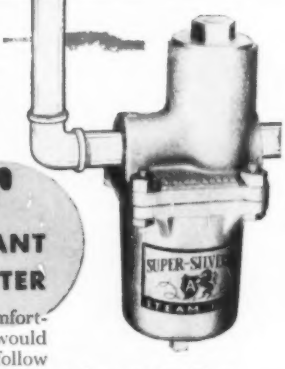
Florida Weather
INTO YOUR PLANT THIS WINTER



● You'll be just as comfortable this winter as you would be in Florida, if you follow this simple suggestion. Put a fast-venting Heat-Kwik Super-Silvertop Steam Trap on every unit heater. Super-Silvertop Heat-Kwiks bring unit heaters up to maximum heat output in 2½ minutes—save hundreds of dollars by letting you turn on steam as much as a half hour later every morning. Put them on every unit heater to keep your plant warm, reduce unit heater corrosion, and to save on fuel bills. See your jobber today.

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FREE—*36-page book shows how to select steam traps for unit heaters.*

SUPER-SILVERTOP STEAM TRAPS

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DATA FILE

(Begins on page 210)

386 Precision Blending System —This 12-pp folder describes the construction operation, flexibility and wide application of a system for accurately blending, compounding or mixing two or more liquids in increments as low as 1/20 per cent. Stresses long-run economy of system. Bowser, Inc.

387 Finishing Systems — Illustrated Catalog A-653, 12 pp, describes complete finishing systems for porcelain and synthetic enamel, lacquer, paint, and other finishing. Also covers a variety of other industrial equipment including ovens, dust collectors and fog filters. The R. C. Mahon Co.

388 Handbook on Crushing — Not an ordering catalog, this 32-pp manual is aimed at a better understanding of mechanical crushing in order to promote better results from crushing operations. Well illustrated, booklet stresses importance of suiting the crusher to the job. Four means of mechanical reduction—impact, attrition, shear and pressure — are discussed. Also included is information on power requirements of crushing and selection factors. Pennsylvania Crusher Co.

389 Oil Cooling Equipment— Catalog F-B 1052, 20 pp, discusses controlled quench, oil cooling for uniform quality in heat-treated metals. Describes and illustrates typical installations of coolers: tells how to select cooling systems; and gives circulation rates. Charts show oil recirculation for batch quenching, determination of amounts of oil required. Illustrates accessories including Kleen-Well oil strainers. "Perambulators" oil coolers, junior quencher, pumps. Bell & Gossett Co.

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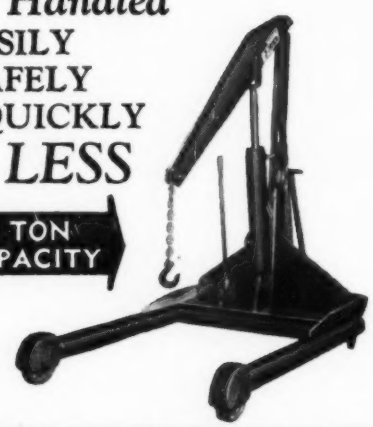

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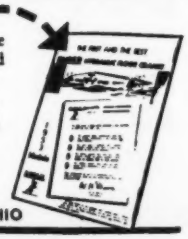

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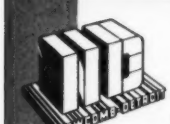

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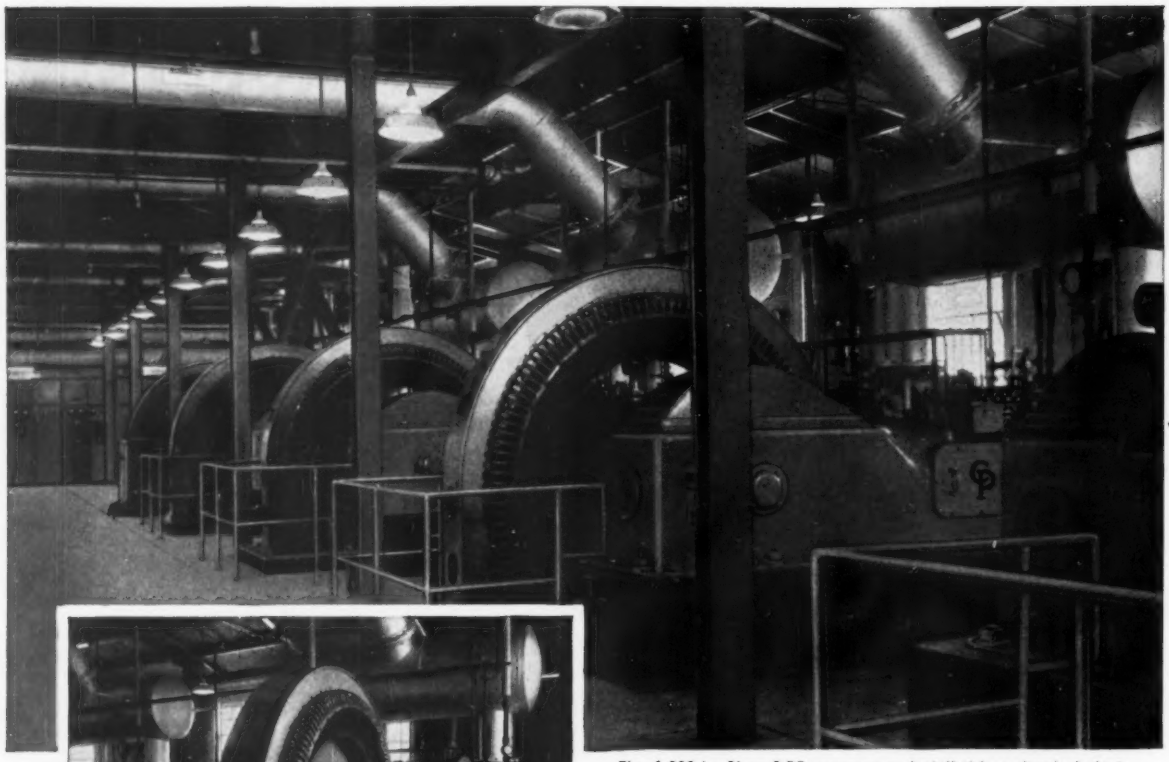

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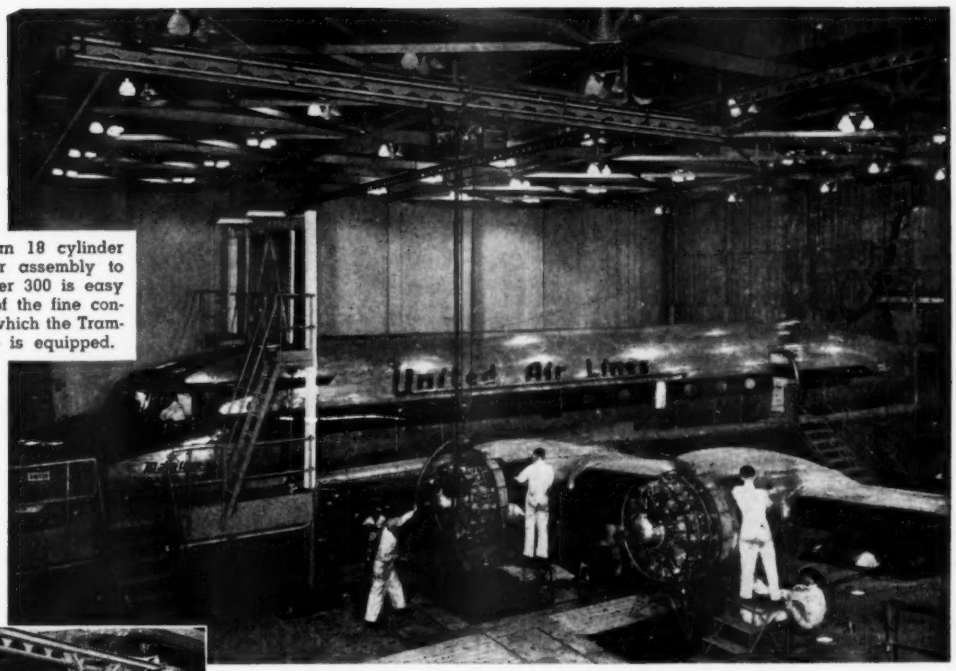
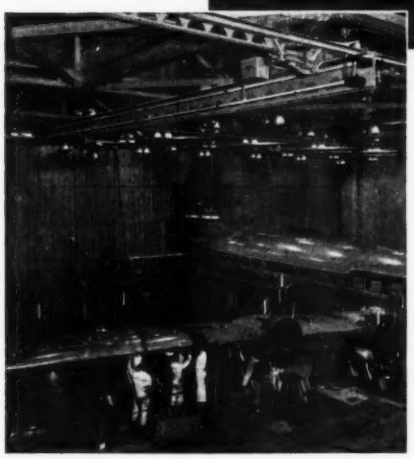


Spotting an 18 cylinder engine for assembly to a Mainliner 300 is easy because of the fine control with which the Tramrail crane is equipped.



Assembling an outer wing section to an inner wing is a delicate job that is greatly simplified by the push-button-controlled Tramrail crane.

ACCURATE SPOTTING OF LOADS A BIG FEATURE

All planes of the United Air Lines are flown regularly to the company's mammoth, modern "Push-button" maintenance base at San Francisco Airport for servicing. While various intermediate servicing operations are conducted at other hangars along the flight routes, this is the main maintenance base where planes are given complete overhauls.

The planes are dismantled in three large duplicate shops located at one side of the building. These shops, which easily accommodate United's huge Mainliner 300's, are each served by a 3-ton fully motorized Cleveland Tramrail crane.

Bridge and carrier travels of the cranes are provided with automatic accelerating control. With this control various speeds are obtained automatically by depressing the pendant push-buttons. Hoists are provided with variable-speed push-button control. This control makes it possible to spot loads accurately, which is of extreme importance. For instance, when engines are installed, there is a myriad of pipes and fittings that must be matched precisely without damage.

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NOVEMBER, 1954

Plant Engineering

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